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Cognitive Requirements for Information Operations Training (CRIOT)

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14. ABSTRACT *(Maximum 200 words)*:

The advent of battlefield digitization increases the work trainers for live force-on-force exercises must do to control exercises and provide feedback to units, and it will pull trainers at platoon and company level out of the tactical information loop. The goal of this study was to describe instrumentation capabilities with the potential for reducing workloads and pulling trainers back into the information loop for exercises at the Army's maneuver combat training centers (CTCs) and at home stations. This study documents the experiences of approximately seventy of the National Training Center (NTC) observer/controllers (OCs) and analysts that participated in the training of the Army's first digitized brigade during the Force XXI Army Warfighting Experiment (AWE). To gain a better understanding of what is required to support digital training, the study team reviewed emerging tactical doctrine from platoon through battalion task force level to develop a sample of potential digital training points and then designed displays that would help a trainer monitor unit performance with respect to these points. The team then defined the capabilities a workstation would need to create these displays. This report describes, defends and illustrates twenty workstation capabilities that support exercise control and feedback for digitized units.

15. SUBJECT TERMS Digitization After Action Review (AAR) Feedback National Training Center (NTC) Maneuver Combat Training Centers Home Station Training Command, Control. Communications, Computers, and Intelligence (C4I) Army Tactical Command and Control Systems (ATCCS)

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FOREWORD

The U.S. Army Research Institute (ARI) Simulator Systems Research Unit (SSRU) conducts research and development and performs studies on training requirements for advanced training systems, devices, and simulators. An important area addressed by the unit is the development of automated systems to support exercise control and feedback for collective training exercises.

The study described in this report was one of three conducted by ARI in FY98 in response to requests from the U.S. Army Training Support Center, Army Training Modernization Directorate (ATMD). The goal of this study was to help define instrumentation systems capable of assisting trainers perform exercise control and feedback functions for live force-on-force exercises in which units through battalion task force level are equipped with Army Tactical Command and Control Systems (ATCCS) and the Force XXI Battle Command Brigade and Below (FBCB2) system. This report documents methods used and lessons learned by trainers and analysts at the U.S. Army's National Training Center (NTC) as they trained digitized units equipped with ATCCS and FBCB2 during the Force XXI Advanced Warfighting Experiment. The report also describes digital training points extracted from Force XXI tactics, techniques, and procedures documents and future workstation displays that can help trainers address these points. This report describes and justifies twenty instrumentation capabilities that can help trainers support training exercises for digitized units. This work was briefed at the U.S. Army Training Support Center on 17 December, 1998 to an ATMD audience that included COL William Jones, Mr. George Burns, and Mr. Terry Faber. The U.S. Army's Simulation, Training and Instrumentation Command's Project Manager for Live Training Systems, LTC Chuck Gault, and representatives of the U.S. Army's National Simulation Center also attended the briefing.

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COGNITIVE REQUIREMENTS FOR INFORMATION OPERATIONS TRAINING (CRIOT)

EXECUTIVE SUMMARY

Requirement:

A previous study found that trainers and analysts for live force-on-force exercises would be overwhelmed by the requirement to support the simulation of new and emerging operational systems and provide units with feedback regarding system employment. Digitization of the battlespace is a major contributor to increases in trainer workloads associated with force modernization. The purpose of the current study was to identify capabilities that instrumentation systems must have to support exercise control and feedback functions for training digitized units through the battalion task force level.

Procedure:

This study was conducted in two phases. In the first phase, we interviewed approximately seventy U.S. Army National Training Center (NTC) observer/controllers(OCs) and analysts that had participated in the Army's Force XXI Army Warfighting Experiment (AWE) to find out how they had monitored digital communications, used digital systems to support exercise control functions, and provided feedback to units regarding employment of digital systems. During these interviews we also asked OCs to describe characteristics of instrumented systems that would help them to perform exercise control and feedback functions for training digitized units.

In the second phase, we examined emerging digital tactics, techniques, and procedures to identify training points that might be addressed by workstation displays to support unit training of digital tasks. We designed and illustrated forty-two displays addressing units from platoon through battalion task force level and encompassing the Advanced Field Artillery Tactical Data System (AFATDS), the All Source Analysis System (ASAS), the Maneuver Control System (MCS), and the Force XXI Brigade and Below (FBCB2) digital systems. We examined each display to decide the capabilities a workstation would require to create each display, and developed a consolidated list of twenty capabilities a workstation would need to create the forty-two displays.

Findings:

This study identified and illustrated twenty capabilities that an instrumented system should have to help trainers and analysts perform exercise control functions and provide units with feedback for exercises involving digitized units.

Utilization of Findings:

The results of this study are being used to define requirements for the NTC Objective Instrumentation System (NTC-OIS). The Army Training Modernization Directorate is using the findings to identify requirements for instrumented systems to support the Joint Contingency Force (JCF) AWE and the Division Capstone Exercise (DCX). The Fort Knox Mounted Battlespace BattleLab and ARI Armored Forces Research Unit are using the findings to help define future digital battle command systems for battalions under the Digital Command, Control, Communications, Computers, Intelligence (DC4I) project, because many of the information displays useful to trainers in controlling exercises and providing feedback for digitized units could also be used to provide unit leaders with real time feedback during mission execution.

COGNITIVE REQUIREMENTS FOR INFORMATION OPERATIONS TRAINING (CRIOT)

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COGNITIVE REQUIREMENTS FOR INFORMATION OPERATIONS TRAINING (CRIOT)

Introduction

Purpose of Study

In force-on-force exercises, the unit being trained (BLUFOR) faces an opposing force (OPFOR). Trainers expend substantial effort performing exercise control functions and providing a BLUFOR unit with performance feedback. Monitoring the flow of tactical information, and contributing to this flow, are important parts of the trainer's job.

Digitization of the battlespace will have many effects upon how information is communicated, the timeliness of communications, and the tools available to employ information. Systems have been fielded that allow overlays and written text messages to be digitally transmitted among nodes, support the transmission of displays showing locations of friendly forces provided by global positioning systems, and support information analyses.

It is reasonable to assume that battlefield digitization will also influence the jobs of trainers for force-on-force exercises. This study is concerned with describing how the addition of visually-based digital communications systems and tactical decision aids influence what the training community must do to control exercises and provide units with feedback. This work was conducted to help in defining the requirements for instrumentation systems needed to support the training of digitized units in live force-on-force exercises at the U.S. Army's Maneuver Combat Training Centers (CTCs) and at home stations.

Background

The genesis for the current study is the TRADOC Report on Live Domain Research Requirements prepared by the U.S. Army Training Support Center (ATSC), Army Training Modernization Directorate (ATMD). The ATMD report (Faber, 1996) states that force modernization initiatives in the Army Science and Technology Master Plan "will make current training support systems obsolete." The report predicts a spiraling workload for trainers and degradation in combat readiness if action is not taken to upgrade support for live training. The ATSC report lays out a high-level research plan for live training to resolve

projected deficiencies through a number of studies. The first study defined by the plan was called the Training Analysis and Feedback Aids (TAAF Aids) Study for Live Training Support, and it was executed as an ARI study.

The TAAF Aids Study examined the specific impacts of over 140 new and emerging weapon, reconnaissance, surveillance, target acquisition, and digital systems on what trainers must do to perform exercise control and feedback functions during live force-on-force exercises, in the absence of any intervention (Brown, Nordyke, Gerlock, Begley, II, and Meliza 1998). TAAF Aids documented the extent of the impact of specific systems on trainer workloads and identified targets of opportunity for using automation to reduce these workloads.

Many of the problems facing trainers concern the advent of digitized communication systems. While trainers in the current voice communications environment can track the flow of information within and across units by listening to multiple radio nets, tracking the flow of visually-based digital communications often requires interacting with a separate computer for each net. This creates a situation where trainers at platoon and company level may be entirely oblivious of the fact that, for example, the unit being observed has received new overlays or orders. Digitization has the potential to greatly increase the amount of information available to a unit, and it leaves the trainer with the challenge of finding out what information was examined by the unit, what the unit did to filter a glut of information, and if/how the unit employed information.

The ATSC live domain study anticipated the need to envision instrumentation systems that would help trainers to perform exercise control and feedback functions for digitized units. ATSC termed the needed study "Cognitve Requirements for Information Operations Training (CRIOT)."

Key Terms

Appendix A provides a list of acronyms and abbreviations used in this report. The terms defined below are used extensively throughout this report.

NOTE: Unless stated otherwise, whenever this report uses the masculine or feminine gender, both are intended.

Information Operations (IO)

IO are continuous military operations within the military information environment that enable, enhance, and protect the friendly force's ability to collect, process, and act on information to achieve an advantage across the full range of military operations. Information operations include interacting with the global information environment and exploiting or denying an adversary's information and decision capabilities. Units conduct IO across the full range of military operations, from operations in garrison, through deployment, to combat operations, to redeployment. IO greatly expand a commander's battlespace, including interaction with the media, industry, joint forces, multinational forces, and computer networks worldwide (Department of the Army, 1996).

Command, Control, Communications, Computers and Intelligence (C4I) Systems

Units perform IO using C4I systems. C4I systems have traditionally been viewed as the combination of communications, warning, intelligence, command and information systems necessary for military decision making and force management. These systems provide the command and control (C2) foundation for optimal effectiveness of the forces. However, C4I now includes other areas such as counterintelligence, Corporate Information Management, and information warfare (Office of the Executive Secretary Department of Defense, 1995).

Intrinsic Feedback

Intrinsic feedback is "downrange" feedback provided to soldiers during exercises as they interact with their tactical systems and other soldiers. It consists of real or simulated entities or activities that stimulate the senses of the players and provide information needed to cue and guide task performance. For example, feedback regarding the location of artillery impacts defines the need for adjusting fires and provides information needed to adjust firing. In terms of C4I activities, intrinsic feedback can include:

- orders and graphics from a higher headquarters;
- communications from higher, adjacent, and supporting units;
- situational awareness (SA) data from a wide variety of

- reconnaissance, surveillance, and target acquisition (RSTA) systems.

Extrinsic Feedback

Extrinsic feedback is provided in the form of After Action Reviews (AARs), Take Home Packages (THPs), coaching, and mentoring. It provides units with guidance for improving performance in future exercises. Extrinsic feedback often provides new perspectives regarding the events that occurred in an exercise. In the case of C4I activities, extrinsic feedback may show relationships between the tactical situation being reported to a higher headquarters with the actual tactical situation (ground-truth). Extrinsic feedback may also be used to consider how communications influenced mission planning, preparation, and execution.

Observer/Controller (OC)

The OC is a tactically and technically competent officer or non-commissioned officer who serves as trainer, observer and exercise controller. He monitors safety, enforces rules of engagement, assesses casualties and battle damage, observes critical tactical events, performs one-on-one coaching, conducts AARs, and submits input to the training unit's THP. OCs at the Army's maneuver CTCs perform OC duties on a full-time basis. Occasionally, personnel from tactical units, TRADOC schools and Reserve Component advisors perform OC duties to augment CTC OCs. At home station installations, tactical units appoint personnel who are not participating in the exercise to perform OC duties for the training unit.

OCs perform a number of duties concerned with providing intrinsic and extrinsic feedback to units. On the intrinsic side, OCs may use communication systems to play the role of higher, adjacent, and supporting units. They may also play the role of a headquarters by providing orders and graphics. To help provide units with extrinsic feedback, OCs monitor the development of unit plans for a mission. OCs also monitor the communications within a unit and between a unit and higher, supporting, and adjacent units. The modes of communication monitored include voice radio, face-to-face, written, and digital. Thorough preparation of extrinsic feedback also requires that the OC identify significant relationships between communications and mission execution.

Training Analysis Facility (TAF) Analyst

At the CTCs, a TAF equipped with computer workstations supports analysts who use a top-down view of the exercise, video, and player tactical voice and digital communications to observe and analyze unit performance. The TAF analyst may be an officer, non-commissioned officer, Department of the Army civilian or contracted civilian. Each TAF analyst is paired with one or more counterpart OCs (i.e., a company team [Co Tm] analyst paired with a Co Tm OC). Working as a team, the OC and TAF analyst control the exercise, exchange observations on player activity, and identify the causes and effects that led to tactical outcomes. Before, during and after the exercise the TAF analyst prepares AAR products to support the OC's AAR presentation. The analyst also integrates OC input and produces the THP for the training/rotating unit.

NOTE: In this report, we use the term "trainers" to refer to OCs and TAF analysts collectively.

Instrumentation System (IS)

The IS is an electronic data collector that monitors position location and the tactical engagement simulation devices on soldiers and vehicles and captures exercise player activity. The IS feeds the TAF with data that the TAF workstations convert into computer-generated graphics providing a top-down view of player location, status (alive or dead), movement, firing activity, etc. The IS also records BLUFOR tactical voice communications, supports OC and TAF control communications, and displays video from mobile video crews in the exercise area.

A crucial point in terms of the current study is that the amount of work OCs and analysts must do to provide units with intrinsic and extrinsic feedback depends to a large extent upon how much of this work can be performed by an IS. In terms of unit C4I activities, we can assist OCs and analysts by designing instrumentation systems that use automation to monitor the flow of communications and relate communications to ground-truth.

Ground-Truth

Ground-truth is information provided by the IS on exercise player locations, status, movement, firing events etc. Ground-truth also consists of OC observations and reports on BLUFOR and OPFOR actions and video clips of player activity captured by fixed video cameras and mobile video crews.

Perceived-Truth

Perceived-truth is BLUFOR's perception of the tactical situation obtained from OC observations and reports and BLUFOR digital and voice communications. Perceived-truth is not ground-truth. BLUFOR-reported OPFOR locations may not coincide with actual OPFOR dispositions. Digital equipment is fallible. There may be incongruities in the friendly information shared among BLUFOR key leaders..

Army Tactical Command and Control Systems (ATCCS)

The ATCCS includes five battle operating system (BOS)-based digital systems used within tactical operations centers and a digital system that may be on board individual vehicles or carried by dismounted infantry. The BOS-based systems are the Maneuver Control Station (MCS), the All Source Analysis System (ASAS), the Advanced Field Artillery Tactical Data System (AFATDS), the Combat Service Support Control System (CSSCS), and the Forward Area Air Defense Command, Control and Intelligence (FAADC2I) System.

Overview of Battalion Task Force (Bn TF) Digital Capabilities

The Bn TF employs three of the five ATCCS--the MCS, ASAS-Remote Workstation (ASAS-RWS) and the AFATDS. Although the Bn TF does not operate the CSSCS and FAADC2I System, the Bn TF benefits from information provided by these systems. The brigade S1 and S4 and the forward support battalion, located in the brigade support area (BSA), orchestrate logistics operations using CSSCS. To coordinate resupply and personnel replacements, the Bn TF uses the FBCB2 to forward logistics and personnel status reports to the BSA for entry into CSSCS. The division air defense artillery (ADA) battalion and Air Battle Management Operations Center (ABMOC) employ FAADC2I to provide early warning of enemy air attack. The ABMOC correlates external tracks of enemy air acquired by high-to-medium altitude radar with other external tracks, i.e., the Airborne Warning and Control System (AWACS). The fire units in the ADA platoon supporting the Bn TF correlate external ABMOC track data with local sensor data and broadcast early warning to the Bn TF using voice communications (Department of the Army, 1997b).

The Bn TF also employs the FBCB2 to disseminate C2 information and SA information down to the individual weapon platform. A communications network called the Tactical

Internet, comprised of a wide area network and local area networks, supports the exchange of data among ATCCS and FBCB2 systems within the brigade and Bn TF (Department of the Army, 1997a). The following paragraphs discuss each digital system available to the Bn TF and the Tactical Internet (TI).

MCS

The MCS is the principal operational interface for tactical planners from Bn TF through Corps. MCS provides the commander and staff a common picture of the battlefield by displaying friendly and enemy activity, unit task organization, and unit readiness status. MCS supports mission planning, orders dissemination, rehearsal, reporting and execution of operations using near-real-time battlefield information (U.S. Army Communications and Electronics Command, 1996; Department of the Army, 1997b).

ASAS-RWS and the Warfighters Associate (WFA) Terminal

ASAS-RWS fuses data from strategic and tactical sensors and other sources to provide a common picture of enemy activity. The system supports the intelligence preparation of the battlefield (IPB) process, facilitating analysis of potential enemy courses of action. ASAS-RWS supports prioritization and management of collection assets, assists in target development, and rapidly disseminates intelligence information to all ATCCS systems (U.S. Army Communications and Electronics Command, 1996;Department of the Army, 1997b).

In addition to the ASAS-RWS, the Bn TF S2 operates a WFA terminal to access the Global Broadcast System/Battlefield Awareness Data Dissemination (GBS/BADD). GBS technology provides wide-band communications and use of Asynchronous Transfer Mode technology that supports high-volume multimedia transmissions. GBS/BADD broadcasts near-real-time battlefield and national data to brigade and Bn TF Tactical Operations Centers (TOCs) in the form of maps, overlays, full-motion video and audio. Example information products include:

-- Weather data.

-- Unmanned aerial vehicle video.

-- Joint Surveillance Target Attack Radar System moving target indicators.

-- Common Ground Station sensor data.

-- MCS overlays.

-- One-way collaborative planning, i.e., brigade commander's intent via video or white board.

Through reachback communications systems, in-theater information is sent to the Information Dissemination Server (IDS) in the Washington D.C. area. An uplink facility located at the Naval Research Laboratory receives the data from IDS and broadcasts the information to unit TOCs in the theater. Using the WFA terminal, commanders establish their information profiles designating the area of interest, time of interest and type of information required. This filters out non-applicable information and provides a "warrior pull" for IDS national/strategic and theater/tactical information that meets the commander's query (Department of the Army, 1997a).

AFATDS

AFATDS processes fire missions from corps through the firing platoon fire direction center. The system provides a fire support planning and coordination capability for field artillery, mortars, attack helicopters, air support, naval surface fire and electronic attack. Based on the commander's guidance and priorities, AFATDS selects the best mix of weapons and munitions to attack the target (PM FATDS, 1998).

Embedded Decision Support Tools

Most of the ATCCS workstations have embedded decision support tools. These tools automate many mundane tasks and present information to users in a way that assists in planning and decision making. For example, AFATDS analyzes incoming calls for fire, compares the target description to the commander's guidance/attack criteria and recommends a fire support asset to attack the target. Depending on user parameter selections, AFATDS may also automatically process fire missions and transmit them to the appropriate weapon system.

FBCB2

FBCB2 provides on-the-move, near-real-time SA and C2 extending from the brigade commander to the individual weapon platform. For dismounted operations, selected soldiers carry

the Dismounted Soldier System Unit (DSSU). The FBCB2 user can prepare and disseminate orders, overlays, requests and reports both horizontally and vertically irrespective of task organization. The FBCB2 exchanges information with ATCCS systems installed in TOC command and control vehicles, the TF commander's battle command vehicle, and the A2C2S(Department of the Army, 1997a).

Tactical Internet

The tactical internet is a collection of FBCB2 computers, voice radios, data-only radios (to support wide-area networking), local area networks and other supporting communications equipment. It is the primary communications architecture for information exchange among combat, combat support, combat service support and C2 platforms at the brigade level and below. The tactical internet supports the transmission of digital C2 information and SA data and also provides a secure voice capability. C2, SA and voice communications operate concurrently on the host platform and are transparent to the user (Department of the Army, 1997a).

Overview of Study Procedures

The objectives of the CRIOT Study were to:

-- identify aspects of digital system operations to which trainers must have access to perform exercise control and feedback functions;

-- Describe types of C4I displays trainers will need;

-- Identify the significance of the information contained on each display;

-- Determine the precise timing for the presentation of the display to the trainer.

This study was accomplished in two phases. First, we interviewed approximately seventy OCs and analysts at the National Training Center (NTC) regarding their experiences training a digitized unit during the Force XXI Army Warfighting Experiment (AWE) in March of 1997. We wanted to:

- document the methods the OCs and analysts used during the AWE to monitor the flow of tactical information, perform exercise control functions, and address the

use of digitized systems in providing feedback;

- identify successes and failures regarding the ability to support digitized training; and

- solicit ideas for using interventions to help OCs and analysts conduct training for digitized unit.

The second phase of this study was concerned with providing an extensive set of examples of information displays that would help support exercise control and feedback functions for digitized units. This work required reviewing the emerging tactics, techniques and procedures (TTPs) for digitized units to identify a sample of digital collective training objectives. Our sample included echelons from platoon through battalion task force level, and addressed each battlefield operating system and all of the ATCCS systems found through battalion level. We then developed and reviewed sample displays to identify workstation capabilities that would be needed to implement the displays.

Phase I: Lessons Learned from the Force XXI AWE

This section of the report discusses significant findings from our interviews with approximately seventy NTC OCs and TAF analysts that supported the Task Force XXI AWE. During the interviews, we asked OCs and TAF personnel to comment on exercise control and feedback functions they performed that related to the C4I systems employed during the AWE.

Methods Used to Stay Abreast of BLUFOR Digital Communications

Our interviews with NTC OCs and TAF analysts revealed that trainers used five methods to observe and assess BLUFOR's use of digital communications during the TF XXI AWE.

Method 1: Video Tap

An Operational Test and Evaluation Command (OPTEC) operator equipped with a video recorder sat in the right seat of each senior Co Tm OC vehicle. The video recorder provided a mirrored, near-real-time display of the Co Tm commander's Appliqué screen. This permitted OPTEC personnel and OCs to monitor the commander's SA and his interface with the Appliqué to prepare messages and view received messages (NOTE: Newer versions of the Appliqué are referred to as the FBCB2).

Method 2: Mirror Unit Systems

There was one Appliqué and one Maneuver Control System (MCS) in each Bn TF TAF to monitor the TF S3. No other digital systems were installed in the TAF to preclude congesting the Tactical Internet.

Method 3: Over the Shoulder

OCs in the Bn TF TOC frequently looked over the shoulder of ATCCS operators to view TF planning and SA. OCs queried system operators on their actions and occasionally asked for printouts to view significant system planning products or digital transmissions.

Method 4: Trainer Cross Talk

OCs cross-talked on exercise control nets to alert each other on the content of significant digital transmissions and to determine when and if BLUFOR players received the information.

When an OC observed a player transmitting a digital message, he asked OCs at the receiving nodes if the players received the message. During the execution phase of the operation, OCs, who were not equipped with the OPTEC video, were out of the digital information loop. Using the OC voice control net, OCs often asked OCs in the Bn TF TOC to provide an update on OPFOR SA

Method 5: AAR Questions

To determine the impact of digital communications on tactical operations, the OCs asked open-ended questions during the AAR to find out how the players used the digital systems and identify the problems the unit encountered. For example, an OC might ask a unit how it employed digital communication systems after it made contact with the enemy.

OC Opinions Regarding Who Should Monitor Digital Communications

The paragraphs below address OC opinions on who should monitor BLUFOR digital communications--the OCs or the TAF. We found it best to organize this information by BOS.

Maneuver OCs

The majority of OCs are not comfortable with equipping their vehicles with Appliqué unless each OC is augmented with a second person to monitor the screen. OCs stated that the communications should be filtered, i.e., fragmentary orders (FRAGOs), contact reports, spot reports (SPOTREPs) and situation reports (SITREPS) (NOTE: This approach of filtering messages by message type may not be a viable solution, since BLUFOR demonstrated a tendency to use plain text messages vice formatted messages to disseminate information). OCs stated that they needed to view the data within the digital system rather than a mirrored display of the player's screen. There were occasions when the commander did not always have the map on his screen panned to the geographic area his unit occupied. Consequently, OCs who had the capability to view OPTEC video screens that mirrored the commander's screen would intrusively request the commander to center his screen on the current area of operations. There were also occasions when the commander's screen saver popped up. When this occurred the OC prodded the commander to remove the screen saver so the OC could view the SA available to the commander. OCs commented that the liquid crystal displays were not bright enough for daylight.

Aviation OCs

Aviation OCs do not want an Appliqué-like device in their OC aircraft (OH-58C). Considering two pilots and NTC density altitude, the aircraft is close to its maximum gross weight. OCs also fly nap of the earth regularly with the players during night operations using night-observation devices (NODs). Aviation OCs say that adding the Appliqué to the aircraft is a distraction and a safety hazard.

ADA OCs

The ADA OC was able to look over the shoulder of his player counterpart to observe unit digital activities during the planning and preparation phases of the mission. However, during mission execution, the OC was outside the digital loop and was unable to monitor ADA digital activities. ADA platoon OCs want an Appliqué mounted on their vehicles to stay abreast of ADA unit SA. OC's are outside the loop on Forward Area Air Defense Ground Based Sensor (FAAD GBS) digital information transmitted among the players. Firing units are equipped with Hand Held Terminal Units (HTUs) and Secure Hand Held Terminal Units (SHTUs) to receive FAAD GBS information. ADA OCs also want a HTU to monitor Forward Area Air Defense Command and Control (FAADC2) traffic. Platoon ADA OCs have no dedicated TAF counterpart.

Logistics OCs

Logistics OCs said they did not want an Appliqué in their High Mobility Multi-purpose Wheeled Vehicle (HMMWV). OCs stated they were in "data smog," monitoring five or six Observer/Controller Communications System (OCCS) control nets. OCs stated that the TAF should have the capability to capture and display logistics data based on user-programmable search parameters. This capability would permit OCs to query the TAF and stay abreast of current and forecast combat power. OCs stated that the TAF must have the capability to dip "anywhere and everywhere" into the logistics data stream. The TAF should have a capability to collect and display data for the current time and the next 24 and 48 hours. The system should assist in explaining why there is a difference in combat power for each time period. The system should have the capability to thread a time line displaying the significant events for a particular item of interest, for example--"I want to know all logistics actions that pertain to Work Order No.12345." To provide this capability, logistics OCs stated they needed a TAF counterpart

for each Bn TF, the Artillery Bn and the Aviation Bn in addition to the existing TAF for the Brigade Support Battalion.

TAF Analyst Comments Regarding Who Should Monitor Digital Communications

Most OCs preferred that the TAF monitor BLUFOR ATCCS and Appliqué communications. OCs indicated that OC and TAF cross talk would keep OCs abreast of significant player digital activities. We informed TAF personnel that the OCs did not want an Appliqué in their vehicle and preferred to have the TAF analyst monitor and report on player digital communications. All TAF sections stated they could not monitor digital communications without tactical equipment equivalent to that used by their BLUFOR counterpart. All insisted that additional manning or augmentation would be required even if the tactical digital systems were integrated with the TAF Solaris workstation. An Aviation TAF analyst estimated that digitized units increased the amount of information coming into the TAF by ten times.

Need for Unit Coaching on Use of Digital Systems

OCs indicated that BLUFOR digital system operators had the information, but "didn't know what to do with it." Digital system operators knew how to operate their systems technically, but did not understand the tactical significance of the information displayed on their screens. Consequently, operators did not alert the TOC leadership to critical tactical events that could have major impact on battle outcome. One OC said the players were getting many answers but did not know what the questions were. Digital system operators did not know how to filter information nor who needed the information for immediate use. These OC observations underline the importance of supporting the OC with information and displays that will enable him to readily mentor his player counterpart in the effective use of digital systems to plan and execute tactical operations.

Support of After Action Reviews

Soliciting Input from Units

At change of mission, Co Tm OCs talk to their player counterparts to determine what the players think the key issues were from the exercise and inform the senior Bn TF OC. OCs use 5X8 cards to record their comments for the AAR.

Bn TF C4I AAR Products

During the TF XXI AWE, the senior OC used statistical charts and snapshots of MCS SA, overlays and situational templates to guide discussions and make key teaching points for the C4I portion of the Bn TF AAR. All OCs agreed that AAR displays contrasting ground-truth with BLUFOR perceived-truth (digital system data) were critical to support BLUFOR discussions on alternative solutions to improve performance. There was one MCS and Appliqué per maneuver TAF, which monitored the Bn TF S3. The TAF provided dedicated manning to the MCS and Appliqué. The TAF made snapshots of ATCCS and Appliqué screens for the AAR. Analysts printed the screen shots, scanned-in the printouts, then loaded the screen shots on floppy disks, which they hand-carried to the AAR site. For a normal AAR, TAF analysts prepare two floppy disks to generate displays from a laptop computer in the AAR support van. These Personal Computer (PC)-generated displays supplement AAR products prepared by TAF workstations. For the TF XXI AWE, the average number of disks prepared ranged from 10 to 15.

Co Tm C4I AAR products

Co Tm OCs used OPTEC video playbacks to support their AARs. OCs used open-ended, leading questions to generate player discussions on how the unit employed Appliqué and benefits gained during the planning, preparation and execution phases of the battle. OCs also used top-down views of computer-generated graphics to show units crossing the line of departure (LD), formations, actions on contact and the first round fired. Co Tm OCs stated that they must receive TAF AAR products no later than change of mission plus two hours to support their AARs.

Co Tm AAR suite

One Co Tm OC had experience in using the Instrumented Co Tm AAR Suite prototype. A HMMWV transports the AAR system, which is set up under a Standard Integrated Command Post Shelter (SICPS) and powered by a generator. The suite uses a bright light projector and an International Business Machines (IBM®) computer to portray still (snapshot) top-down views of computer-generated player activity and PowerPoint® slides. The AAR prototype also has the capability to play back audio and video. A mobile video crew provides the receiver to capture microwave

signals for video and audio playbacks. There is no capability to display hyper (play backs of computer-generated graphics at faster than normal speed) ground-truth AAR aids. The system is not available on days when there is a Bn TF AAR. The OC can back the HMMWV AAR suite into the Bn TF TOC and give an abbreviated AAR. A TAF analyst operates the AAR suite. The OC, who used the system, stated that the HMMWV tent is too small to support the Co Tm AAR audience. During daylight, it is difficult to see the screen and difficult to read text-based displays in the SICPS. The OC experienced in using the system stated that hyper playbacks of Solaris computer-generated graphics was a capability needed to support effective, credible AARs. Co Tm OCs stated they would like to have the capability to use the HMMWV AAR system twice during a rotation, particularly during the early exercises.

Entering Overlays into the TAF Workstation

The TAF has no capability to electronically copy, paste and scale an overlay from the Appliqué or MCS into the TAF workstation for display during the exercise or for the AAR. The TAF Solaris workstations, ATCCS and Appliqué use different datum maps. It is very difficult and time consuming to transcribe an overlay from the tactical digital system into the Solaris workstation. The brigade TAF printed overlays, and then manually entered control measures into the Core Instrumentation System computer. In some TAFs, the OCs hand-carried Bn TF and Co Tm orders from the exercise area to the TAF for entry of acetate overlays into Solaris workstations.

Digital Role-playing

The NTC digitally role-played the Division TOC (DTOC) using 4th Infantry Division augmentees. The NTC DTOC passed manually prepared orders and overlays to the collocated 4th Infantry Division tactical command post, which digitally transmitted the orders to the rotating brigade.

Challenges Monitoring Aviation Tactical Operations Center (AVTOC) Digital Communications.

The AVTOC used a "Mesh Net" in which TOC personnel communicated via headsets and mike booms. The AVTOC provided the TOC OC a separate jack so he could monitor staff coordination and planning without obtrusively intruding on the AVTOC staff. The Army Airborne Command and Control System (A2C2S) presents a major challenge to OCs. A single OC occupies

a seat on the aircraft designated by the unit. To stay abreast of digital communications, the OC must use the aircraft's intercom and query the computer station operators. Depending on the OC's seating in the aircraft, he may be able to view one or more of six screens or none.

Shortage of Aviation TAF Analysts

The Aviation TAF consists of one major, two captains, one noncommissioned officer and four civilians. The Aviation TAF performs flight following, as well as control and feedback duties. There is no TAF counterpart for aviation company OCs. The Aviation TAF does not have the tactical digital systems or manpower to role-play the higher headquarters.

No Logistics Digital Interface between NTC and BLUFOR

OCs stated that units reverted to manual procedures to interface with NTC's notional G4 and division support command. This problem needs to be corrected to avoid imposing additional requirements on the BLUFOR, as well as to allow NTC trainers themselves to take advantage of automation.

The medical OC stated that data from the soldier's ID card (personal and medical information) will be "swiped through a device" during casualty evacuation, grave registration and personnel management operations. The IS should have the capability to capture this personnel data.

Overview of Bn TF Employment of Digital Communications

The Bn TF relies primarily on digital communications during the planning, preparation and reconstitution phases of the operation. For those tactical nets used for both voice and digital transmissions, minimizing voice traffic frees the net for the transmission and receipt of digital requests, reports and orders. This procedure also reduces voice and digital traffic contention (voice overriding digital) for those platforms that do not have a dedicated data radio and minimizes the Bn TF's susceptibility to enemy monitoring, direction finding and jamming (Department of the Army, 1997b).

According to NTC OCs we interviewed, TF XXI AWE units found it necessary to prepare and transmit large files (i.e., overlays) in segments due to latency problems. Co Tm OCs stated that the processing/transmission time for one chunk of the operations order was five to ten minutes. Experimental Force

(EXFOR) TTP published since the AWE recommends transmitting the "essential information" of large operations orders (OPORDs) and overlays first to maximize planning time for subordinates. Follow-on transmissions are made as required for additional narratives and graphics (Department of the Army, 1997b).

Upon enemy contact, the Bn TF resorts to voice communications following the TOC/command group's acknowledgement of the initial digital contact or spot report. The platoon in the Co Tm that makes the initial contact renders a voice contact report over the Co Tm command net. The Co Tm executive officer (XO), who eavesdrops on the command net, transmits a digital contact report to the Bn TF commander and S3 to inform them of the enemy situation (Department of the Army, 1997d). A digital spot or contact report will not automatically generate an enemy icon on the sending or receiving FBCB2 screen. To display enemy icons, an operator must manually enter enemy data in the FBCB2 enemy situation overlay (Department of the Army, 1997e). However, if multiple FBCB2 operators enter and transmit an enemy overlay displaying the same threat, the size of the enemy will be exaggerated. To preclude this problem, the Bn TF S2 is responsible for preparing the enemy overlay, annotating known versus suspected enemy positions and transmitting the overlay to the TF. If the S2 rapidly and frequently transmits updated enemy situation overlays, he will provide the Bn TF a clear picture of enemy dispositions. The Bn TF continues to use voice communications augmented by FBCB2 SA until the enemy force is defeated or bypassed. Concurrently, the Bn TF TOC sends digital situation reports and overlays to higher and adjacent units using ATCC systems, facilitating comprehension of the tactical situation and reducing the need for clarification" (Department of the Army, 1997b).

In addition to digital enemy situation updates, there are other occasions when the Bn TF will use digital communications following actions on contact. For example, if the lead Co Tm encounters an obstacle during movement, the Tm will report the obstacle by voice and follow-up with a digital overlay depicting the area affected by the obstacle. After the breaching force breaches a lane through the obstacle and secures the far side, a designated element prepares a FBCB2 graphic showing the lane through the obstacle so follow-on units can easily locate the start point of the lane. This graphic is critical, considering the reduced visibility caused by the smoke and dust in the vicinity of the obstacle (Department of the Army, 1997d).

During reconstitution, the Co Tm first sergeant (1SG) consolidates reports from platoon sergeants and coordinates logistical support through digital logistical situation report (LOGSITREP)s and Call for Support requests. The 1SG uses the FBCB2 personnel situation reports (PERSITREP)s to report personnel losses. Based on the reports provided by Co Tm 1SGs, the Bn TF S1 and S4 coordinate resupply, vehicle recovery and repair, and personnel replacements through the brigade S1/S4 and supporting units in the BSA (Department of the Army, 1997b).

C4I Intrinsic Feedback

The TAAF Aids Study revealed that BLUFOR players receive a large percentage of their C4I intrinsic feedback from hands-on operation of their digital systems and from interactions with other digital systems. However, there are some intrinsic feedback requirements that cannot be fulfilled without trainer assistance. CTCs must provide the Bn TF access to information sources that the TF could reasonably access in combat. There is also an intrinsic feedback requirement for the Exercise Management and Control Cell (EMCC) to role-play the DTOC or Joint Task Force (JTF) headquarters. As an exercise control function, the EMCC issues division or JTF operations orders, responds to rotational brigade requests for support from divisional or JTF assets, and role-plays other non-players such as adjacent and supporting units. By meeting the C4I intrinsic feedback requirements for the rotational brigade, the EMCC, through the brigade, meets the intrinsic feedback requirements of the Bn TF.

What information must be made available to the Bn TF? The player brigade ATCCS will provide the Bn TF access to historical and near-real-time data elements for all five BOSs)--maneuver, fire support, air defense, intelligence/electronic warfare, and combat service support. This will include information such as logistics reports, weather data, terrain data, intelligence data, enemy and friendly information, and decision support tools. However, exercise controllers in the EMCC role playing as DTOC or JTF headquarters must digitally feed the brigade ATCCS. Depending on the nature of the mission, the brigade and Bn TF could require access to data from sources as high as the National Command Authority. Requested GBS/BADD broadcasts could include weather, maps, satellite images, unmanned aerial vehicle data, intelligence, target information and broadcast television.

Figure 1 shows DTOC controllers performing digital control functions, but DTOC augmentees from the brigade's parent

headquarters could also perform these functions. If exercises employ DTOC augmentees, the DTOC controllers must still provide written orders and instructions through augmentees to provide BLUFOR players the needed intrinsic feedback. The Bn TF should be able to access information through connections that will be in place if the unit actually deployed. This "smart push" and "warrior pull" of information will improve the realism of the exercise and maximize the training benefits of the CTC experience.

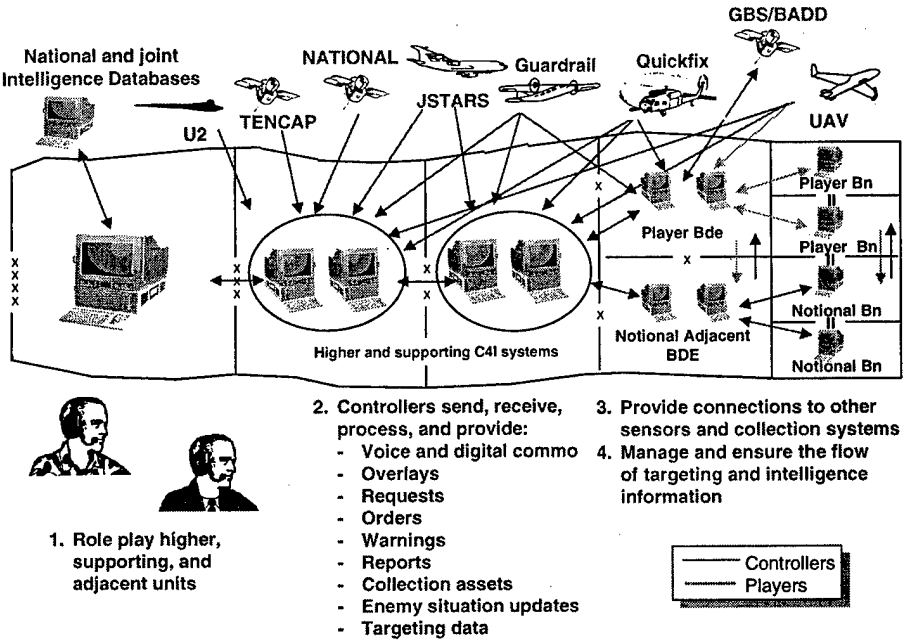


Figure 1. Division tactical operations center (DTOC), joint task force (JTF) and exercise management and control cell (EMCC) C4I intrinsic feedback functions.

C4I Extrinsic Feedback

As for C4I extrinsic feedback, the good news about battlefield digitization is that there is a great deal of available data for the OC and TAF analyst to examine and determine the cause and effects that led to battle outcome. The bad news is that the volume of data is overwhelming and difficult to access.

At the CTCs, the only instrumented C4I data available is BLUFOR tactical voice communications. The majority of the information needed to assess C4I performance is not available through the IS. This situation creates manually intensive procedures for the OC and TAF analyst.

A major problem with the FBCB2 and the DSSU is that these visually based communications systems are distributed to individual vehicles and dismounted leaders. This makes it difficult to look over the shoulder of the system operator/user. With digital systems in the TOC, the OC can look over the shoulder of the operator. However, the user may be a commander or staff member who may be elsewhere consulting a paper-based situation map, interacting with commanders and staff, or coordinating via voice radio communications. An OC's counterpart may delegate the responsibility of interacting with a digital system to an operator or assistant. However, the OC has no one to whom he can delegate responsibilities to observe digital screens or his BLUFOR counterpart.

Determining precisely what the ATTCS or FBCB2 operator is viewing at any given time could be valuable. However, even if the IS captured all digital traffic, it is not feasible for the IS to identify the exact information the operator is viewing on his C4I system. Trainers will not know which display options an operator selected nor which decision support tools the operator used. Further, it is impossible to determine from instrumented data what cognitive processes the operator performed on the information received. Did the operator actually read the message or did he just press the button that turns off the message alarm?

Determining which decision support tool the operator used, what messages he read, and how he used acquired information is not possible unless an OC continually observes the operator's activity. OC manning limitations will not permit this. The AAR may become the means by which OCs learn the decision support information BLUFOR consulted and how the players used the information. The best approach may be to identify the performance problem, and then retrieve information available to the BLUFOR that impacted on the problem. During the AAR the OC may ask members of the AAR audience what decision support tools they used, who they informed of their findings, and what information proved useful in generating courses of action and arriving at a decision. With the overwhelming amount of information available to units, the major job for OCs and TAF analysts is to coach units on how to filter information to fulfill priority information requirements.

Phase II: Generating Sample C4I Displays

Procedures for Developing Displays

During Phase II of the CRIOT study, we developed displays needed by trainers to observe and assess BLUFOR employment of ATCCS and FBCB2 systems. In developing the displays, we established an audit trail to link each display to digital doctrine. We cross-walked selected subtasks in the Army Training and Evaluation Program (ARTEP-MTP with "how to" information in TTP manuals for digital units. Then we linked the TTP with equipment operator instructions in digital system manuals/guides. These references do not readily lend themselves to tracing a doctrinal thread for digitized operations, so we inferred when we were required to do so. In the paragraphs below, we describe the CRIOT Phase II methodology in detail using the ASAS as an example digital system.

ASAS Example

For ASAS, we selected two task steps/subtasks under the task "Perform intelligence operations" from the FKSM 71-2-1-(EXFOR) Digital Tank and Mechanized Infantry Battalion Task Force ARTEP-MTP (Department of the Army, 1997c). These subtasks provided context for our analysis of feedback requirements for representative ASAS operations. The two subtasks we selected were "Prepare intelligence estimate" and "Disseminate intelligence information." Using these subtasks, we determined typical ASAS data and other information the OC and TAF analyst must receive to monitor the Bn TF S2's performance and present AARs.

We performed our analysis in five steps:

(1) We prepared a C4I Task Matrix to crosswalk TTP for the two subtasks with ASAS input and output requirements. In the task matrix, we decomposed the two subtasks into their key elements. Using FM 34-130, Intelligence Preparation of the Battlefield (IPB); FM 101-5, Staff Organization and Operations; and FKSM 71-2-1 (EXFOR), The Digitized Heavy Battalion, we identified the key elements of each subtask and determined the actions required to accomplish them. Finally, we searched the ASAS Digital Operators Guide and translated required actions into ASAS input and output (see Table 1).

Table 1. Sample Task Matrix

TASK	KEY ELEMENTS	APPLICABLE TTP	ASAS INPUT AND OUTPUT
The S-2 prepares the intelligence Estimate.	1. Defining the Battlefield Environment.	The area of interest (AOI) must be established which includes the terrain in which activity may occur that would affect the upcoming mission.	Create Geographical Areas USER INPUT: Select either named area of interest (NAI) or target area of interest (TAI) as the type of area to create. Pick the points, plot the area and name it. ASAS OUTPUT: The geographical areas are now available for queries and criteria. Create an AOI USER INPUT: Select the map point needed to depict the area of interest desired and name it. ASAS OUTPUT: The AOI will appear on the map.

(2) We developed a Performance Assessment Matrix (Table 2) to describe ASAS data and other information the TAF analyst must view or hear to assess the S2's performance. The matrix describes the information the TAF workstation should display and indicates when the workstation should present the information to the analyst. The matrix also discusses the significance of the information in assessing performance.

Table 2. Sample Performance Assessment Matrix

DISPLAY								
INTENT: Show the accuracy of intelligence from the planning phase of the operation by crosswalking ASAS products with IS ground truth before the battle begins (Display 1). Show the age of BLUFOR intelligence information (Display 1a).								
ASAS DATA	**TAF WORKSTATION DISPLAY**	**Near Real Time - Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real Time - Alert to User**	**Show on User Cmd**	**AAR**
Area of Interest, battlefield graphics, reported enemy locations, avenues of approach, mobility corridors and defensible terrain from Intel Estimate.	**DISPLAY 1 :** ***Snapshot Aid.*** Shows the area of interest and the actual locations of both friendly and enemy units. The snapshot is taken at the same time the Intel Estimate is transmitted. TAF Workstation overlays ASAS graphics on IS ground truth.	**X**	**X**	**X**	**DISPLAY 1a :** ***Table Aid.*** Portrays DTG of the most recent Battlefield Graphics, Intelligence Summaries and External Database Coordination with higher headquarters, SPOTREPs, and Free Text concerning enemy activity. Timing - Display in real time as the S2 receives the messages.	**X**	**X**	**X**

The matrix describes two types of displays--the alert display and the AAR display or aid. The alert display notifies the TAF analyst that a significant event has occurred or that

the TAF workstation has sensed a situation the analyst should be aware of. For example, the workstation may alert the analyst to the transmission of a digital contact report from a Co Tm XO to the Bn TF S3. The TAF workstation may sense there is a major disconnect between BLUFOR's perception of OPFOR's dispositions and OPFOR's actual dispositions and alert the training analyst to this condition. The purpose of the second type of display--the AAR aid--is to promote dynamic interactive discussions among members of the AAR audience on what happened, why it happened and how to improve performance. In some cases, an alert display may also serve as an AAR aid. In the Performance Assessment Matrix, we refer to various types of AAR aids. In Table 2, we refer to Snapshot and Table aids. A Snapshot aid is a still, top-down view that may show ground-truth IS data, perceived-truth from BLUFOR digital systems, or a contrast of ground- and perceived-truths. For example, the Snapshot may show ground-truth BLUFOR and OPFOR entity locations at an instant in time with superimposed BLUFOR tactical overlays and reported OPFOR dispositions. A table aid is a matrix of data, i.e., a digital message log. The alert displays and AAR aids described in the Performance Assessment Matrix drove the design of the illustrations we developed in the third step of our methodology.

(3) We prepared illustrations of each alert display and AAR aid described in the Performance Assessment Matrix to ensure we had identified all information needed to meet the "INTENT" described in the matrix. The display in Figure 2 alerts the TAF analyst to IPB products that the Bn TF S2 digitally transmitted to higher, adjacent, lower and supporting units. The display superimposes a combination of S2 digital overlays over actual OPFOR dispositions provided by the IS. The display shows the accuracy of the S2's intelligence estimate before the initiation of the BLUFOR attack. The table below the graphical display is a digital message log. As the IS eavesdrops on BLUFOR digital traffic, the workstation posts header information about each message in the message log. The TAF analyst may view the contents of a message by clicking on the message ID number. The display below may be useful to the TAF analyst as an alert display during the exercise and as an AAR aid after the exercise.

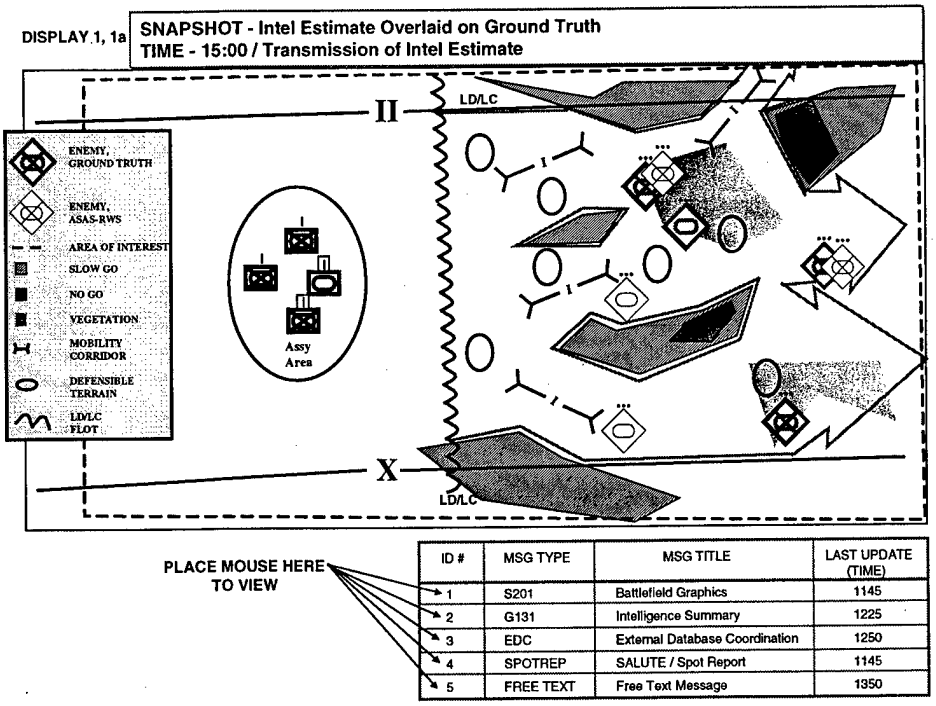


Figure 2. Sample TAF workstation display.

(4) In the next step of our methodology, we described how the OC could use the displays to support AAR discussions on what happened, why it happened and how to improve performance (see Figure 3). Under WHAT HAPPENED, we narrated what the illustration showed. Under WHY IT HAPPENED, we posed candidate questions the OC may use to generate discussion among AAR participants on the causes and effects that led to battle outcome. Under HOW TO IMPROVE PERFORMANCE, we restated desired performance contained in TTPs and Center for Army Lessons Learned trends and newsletters. The TAF analyst completes the WHAT HAPPENED section. The TAF workstation automatically provides the candidate questions under the WHY IT HAPPENED section and the information under the HOW TO IMPROVE section. The OC will not display the information below to the AAR audience. The display is for the OC's eyes only to support his introduction and discussion of the AAR aid in the previous figure.

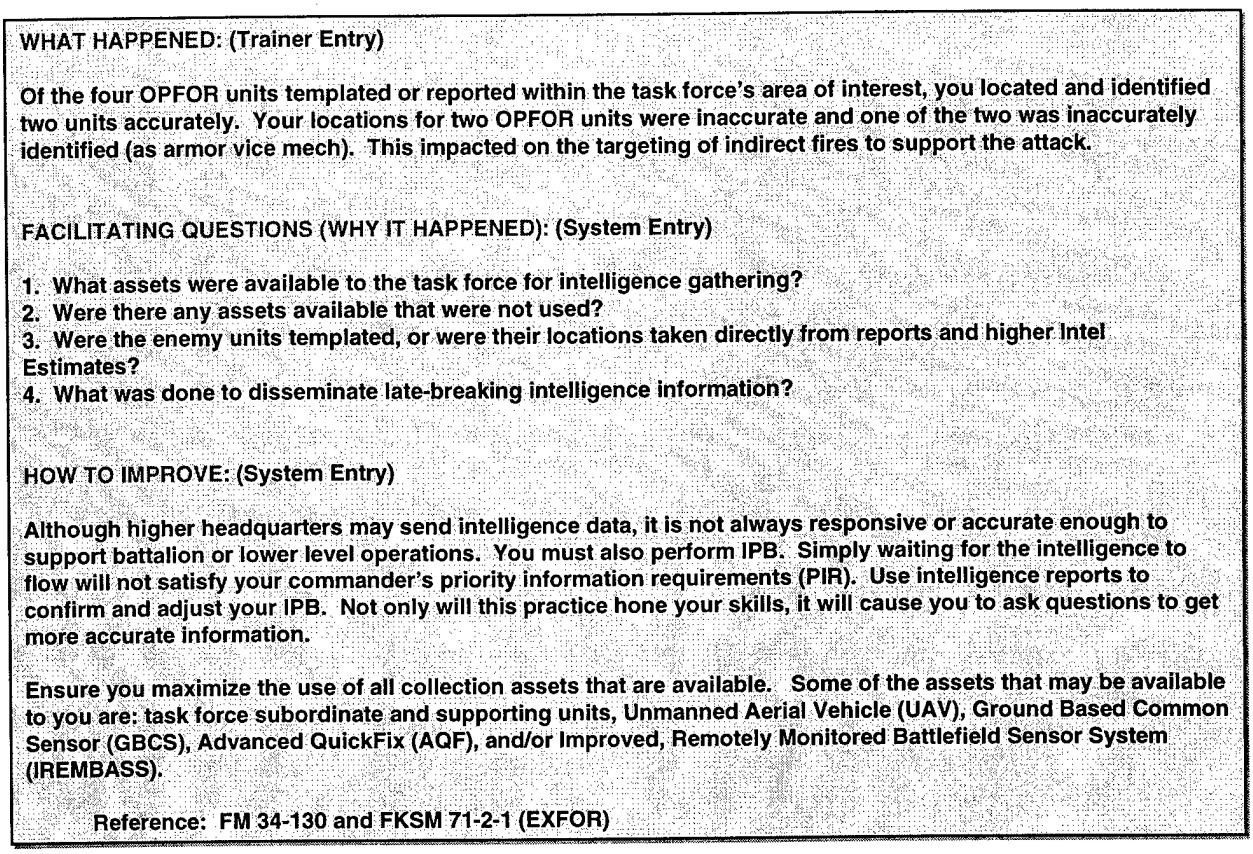


Figure 3. Discussion points for AAR displays.

(5) In the last step of the CRIOT Phase II methodology, we examined each illustration and described IS and TAF workstation capabilities needed to generate the display. The resulting product was a consolidated list of twenty capabilities needed to generate displays.

IS and TAF Workstation Capabilities Needed to Generate C4I Displays

We used the five-step methodology to create trainer alerts and AAR aids for scenarios employing ASAS, MCS, AFATDS, FAADC2I and FBCB2. For FBCB2, we developed a Co Tm scenario and two platoon scenarios. Appendixes B through G depict the recommended C4I displays and user interface features to support the TAF analyst in monitoring and assessing digital operations. Appendix B addresses AFATDS, Appendix C addresses ASAS, Appendix D addresses MCS, Appendix E addresses a company team FBCB2 scenario, Appendix F addresses an armor platoon FBCB2 scenario, and Appendix G addressed an ADA platoon FBCB2 scenario.

As we prepared trainer alerts and AAR aids for the various scenarios, we distilled IS and TAF workstation capabilities needed to generate the displays. We identified 20 capabilities needed to assess command and control performance across all Bn TF digital systems - regardless of the player node or type digital system monitored. Incorporation of these capabilities into the TAF workstation will minimize requirements for additional analysts to monitor player digital communications. Below we discuss and illustrate each of the 20 IS/TAF workstation capabilities derived from our analysis.

1. Transmit as Well as Receive Digital Messages

The AAR workstation should be able to transmit digital messages as well as monitor digital traffic among exercise players.

Rationale: To cue BLUFOR command and control actions and portray the activities of notional units, TAF analysts must digitally role-play higher, adjacent and supporting units; transmit orders; respond to player requests for information; and disseminate warnings and reports. For example, CTC Exercise Management and Control Cells should be able to digitally role-play a DTOC or JTF headquarters.

2. Easily Accommodate Changes in ATCCS Systems

The design of the TAF workstation should not tie it to specific versions of ATCCS or FBCB2 software. The workstation should use a stable software package that relies on a data stream of standard data packets rather than specific software versions of tactical digital systems. The workstation should not require a software upgrade with each new version of ATCCS/FBCB2 software unless the new version uses new messages or new message formats.

Rationale: This approach will reduce training and software support requirements caused by continual software upgrades that occur across all ATCCS/FBCB2 systems.

3. Emphasize Unit Performance Assessment Rather than Duplication of Digital Displays

TAF workstation displays should present information in a way that readily supports performance assessment and AAR

presentations. TAF workstation displays do not have to be identical to tactical digital system displays.

Rationale: Many tactical digital system displays do not readily support performance assessment or AARs. In many cases, the trainer must view and present tactical information in conjunction with other information provided by the instrumentation system (i.e., ground-truth). The integration of player tactical information with IS-provided information requires a custom display that will promote training analysis, exercise control and collective learning for AAR participants.

4. Integrate Digital Communications with IS Ground-truth Data

The TAF workstation should integrate the display of BLUFOR digital C2 and SA data with IS ground-truth data.

Rationale: This capability will eliminate the time consuming procedure whereby the analyst manually extracts overlays from the tactical digital system and manually scales and redraws BLUFOR control measures into the TAF workstation. This approach reduces the number of computer monitors the analyst must crosscheck and promotes comparative analysis between BLUFOR SA and IS ground-truth data.

Example: Figure 4 depicts ground-truth versus perceived-truth locations.

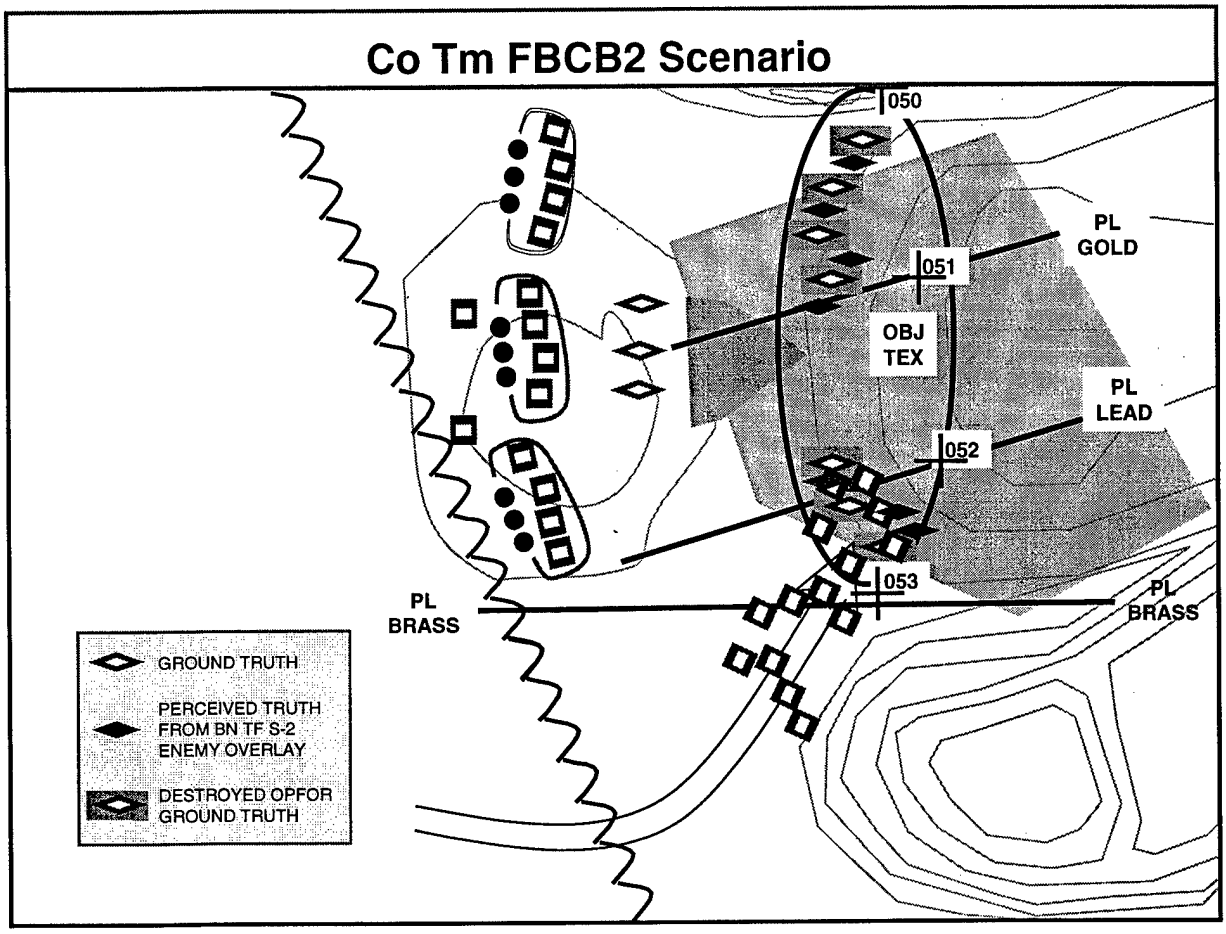


Figure 4. Display comparing IS ground-truth and BLUFOR perceived-truth.

5. Selectively Display Messages for Specific Nodes

The TAF workstation should portray digital messages for user selected node(s) in a digital message log and along a timeline. The message log should depict message type, sender, intended receivers, time transmitted, total transmission time, file size, and any non-acknowledgements (NACKs) for messages. The time required by the sending unit to transmit the message and file size is particularly important if a highly constrained band width continues to pose problems for the Tactical Internet. The workstation should also annotate digital messages along a timeline indicating transmission and receipt times.

Rationale: Trainers require this capability to monitor the digital messages transmitted and received by their BLUFOR counterparts. Trainers monitor digital traffic in near-real-time to control the exercise, assess performance and to

establish an audit trail of the causes and effects that led to a specific tactical outcome. Trainers will have occasions to recall messages from exercise history. These messages will allow the analyst to scrutinize past tactical events in more detail. OCs need the information in the digital message log to coach units on how to minimize file size for rapid transmission of plans and orders. NACKS allow the analyst to readily determine who did and did not receive a request, report, order, or overlay, which, in turn, may provide insights into what happened and why it happened. Portraying events along a timeline provides the analyst a spatial perspective of messages transmitted and received for selected BLUFOR nodes.

Example: In Figure 5, the TAF analyst is viewing the timeline and the digital message log. The analyst may view the digital message log, the timeline or both.

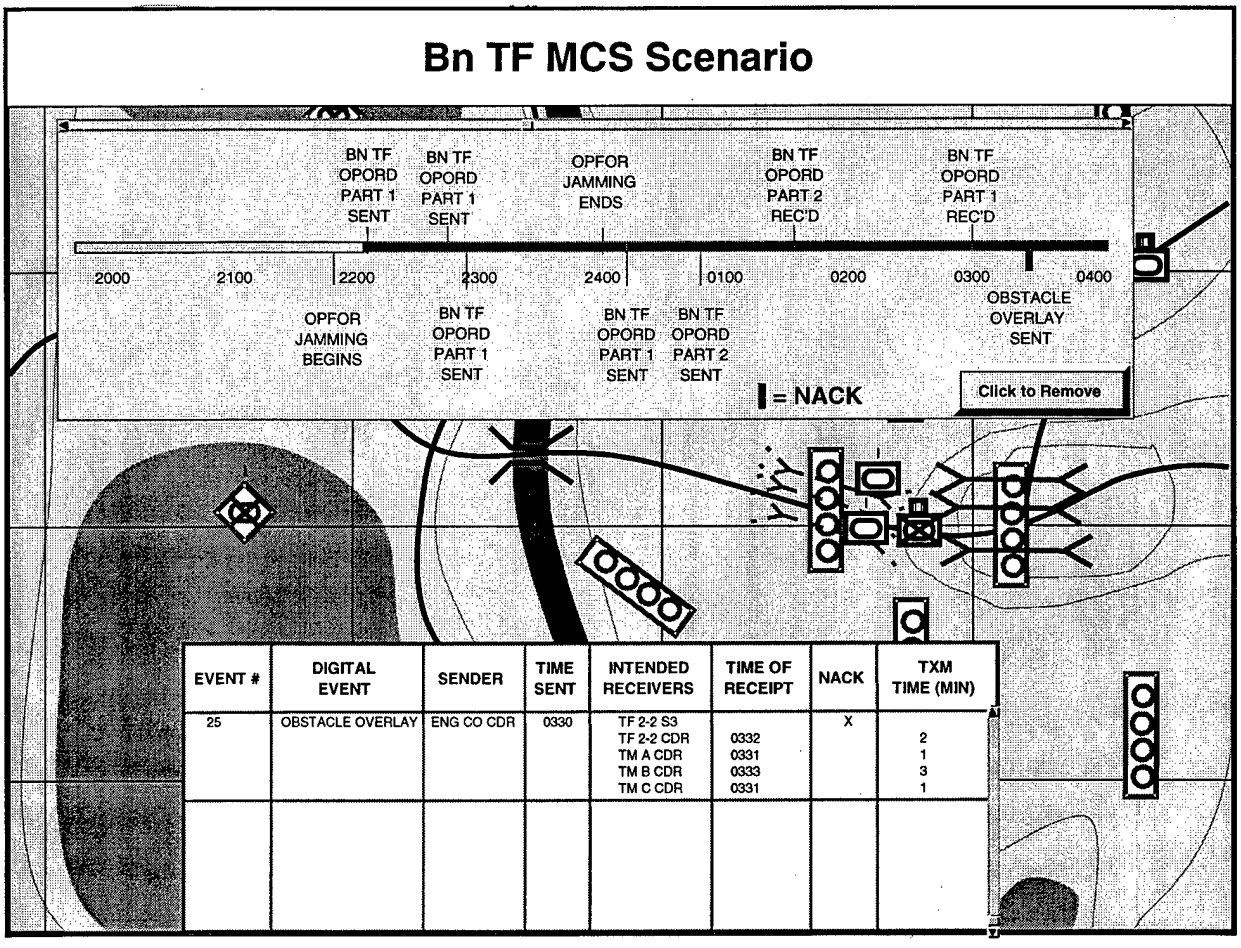


Figure 5. Displaying showing digital message log.

6. Allow Selective Review of Message Contents from a Log

The IS should provide the TAF analyst the capability to selectively view the contents of messages appearing in the digital message log.

Rationale: The digital message log permits the analyst to remain abreast of the nature of digital traffic for selected BLUFOR players (i.e., contact report, fire support overlay, plain text message). The analyst also needs the capability to view the contents of messages to observe and analyze BLUFOR C2 actions.

Example: Figure 6 shows the TAF analyst clicking on the event number in the digital message log to view a message.

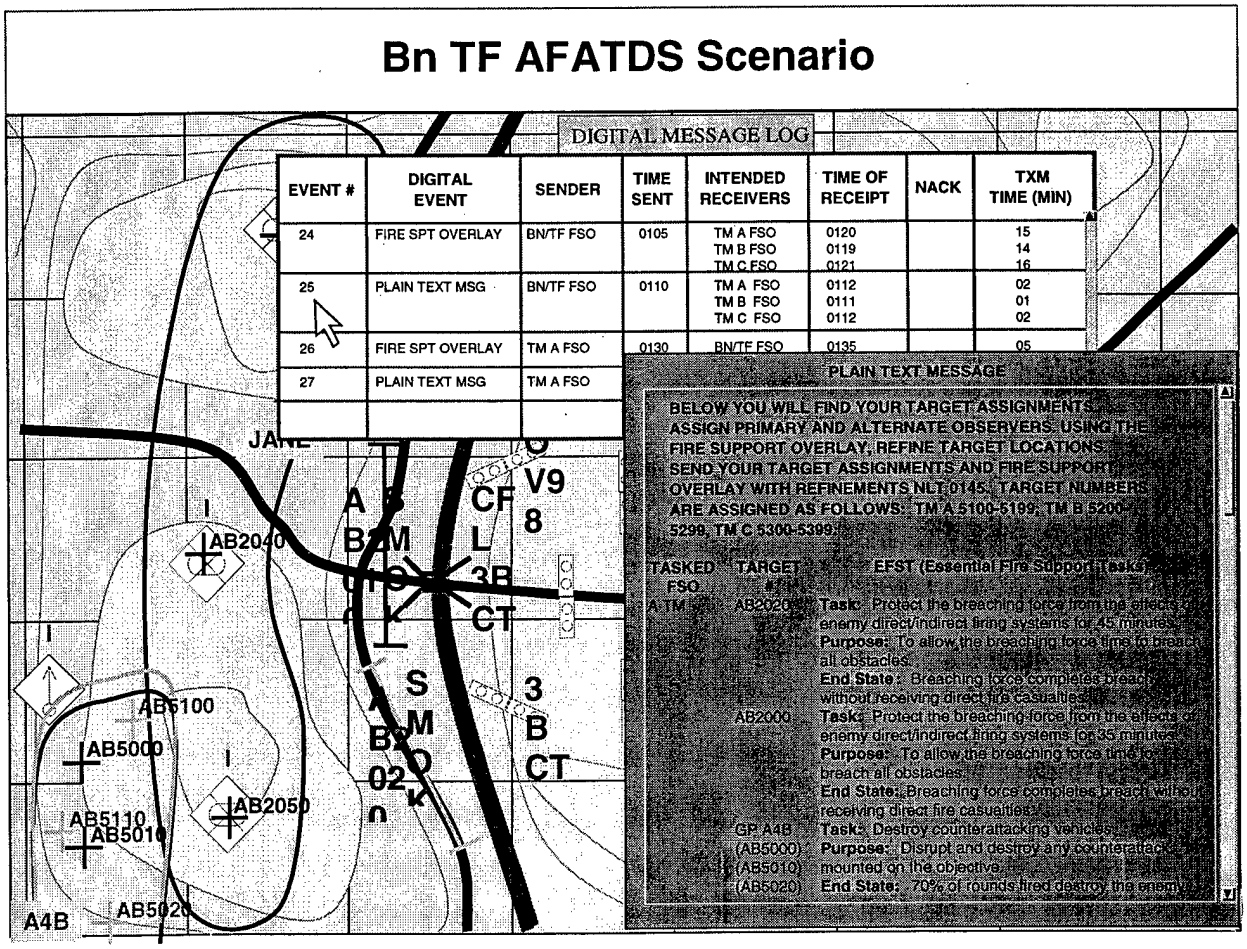


Figure 6. Using a digital message log to select messages to be displayed.

7. Allow Selective View of Message Contents from a Timeline

The TAF analyst should be able to readily view the contents of messages annotated on the timeline.

Rationale: To maximize his view of player activities, the analyst will probably display the digital message log or the timeline, but not both. Providing the analyst a capability to view the contents of digital messages from the timeline will eliminate toggling back to the digital message log and minimize screen clutter.

Example: Figure 7 shows the analyst clicking on the timeline entry to view the contents of a message.

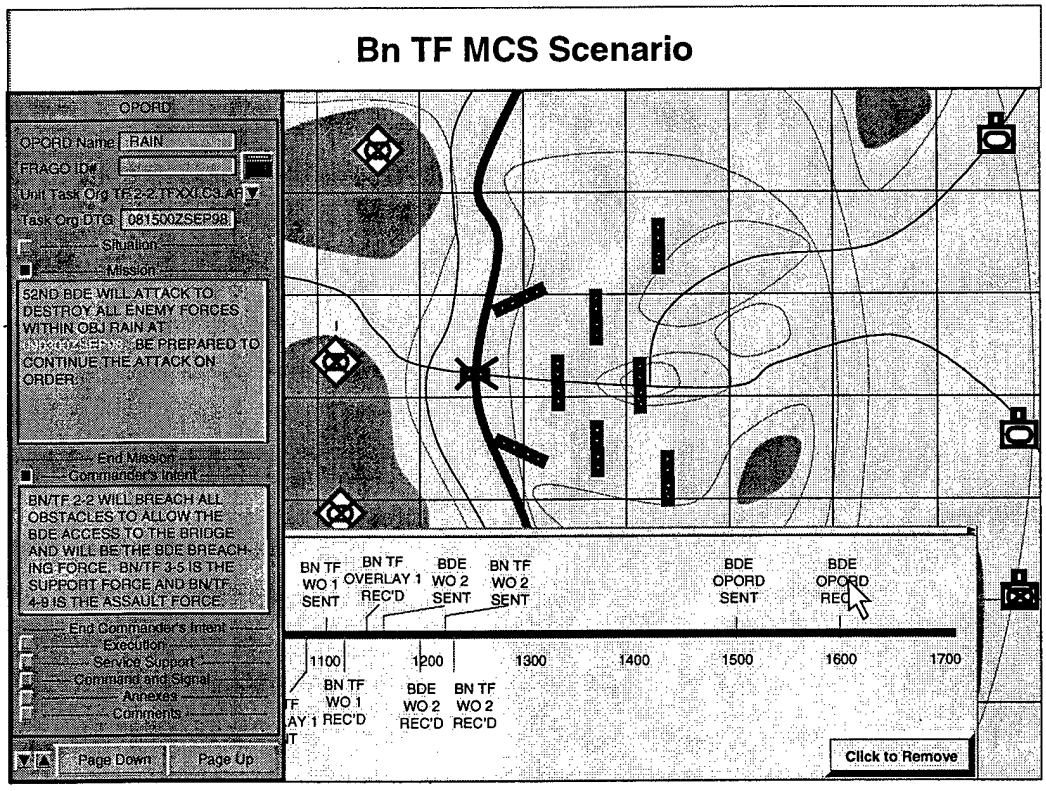


Figure 7. Using a timeline to select messages for which content will be displayed.

8. Support Monitoring of TOC LANs and the Tactical Internet

The IS should have the capability to monitor TOC LANs, as well as digital messages transmitted wirelessly on the Tactical Internet.

Rationale: This capability permits the analyst to view digital messages exchanged among TOC staff members during course of action development, orders preparation, mission preparation, mission execution, and reconstitution.

9. Allow Rapid Access to Specific Nodes and Capability to Filter by Message Type and Geographic Location

The TAF workstation should provide the analyst the capability to view messages transmitted and received by multiple player nodes. The trainer should be able to change from one digital node to another rapidly. Additionally, he should be able to filter digital information for a given BLUFOR node based on message type(s) or geographical area(s).

Rationale: This capability is particularly critical if an analyst must role-play multiple notional units or monitor the activities of multiple players. For example, there will be occasions when a TAF exercise controller must role-play an adjacent brigade or the division G3. On occasion, the OC will ask his Co Tm analyst to provide information on digital messages transmitted or received by the Co Tm commander, XO, fire support officer, a platoon leader, or the first sergeant. Since there is an overwhelming amount of digital information exchanged among the BLUFOR players, trainers need a capability to filter the information. As the battle unfolds, the system should identify messages pertinent to the areas designated by the analyst. The analyst may wish to filter messages by message type during particular phases of the battle (i.e., view only contact reports, spot reports and plain text messages during the movement from the line of departure (LD) to the objective).

Example: In Figure 8, the analyst is selecting the player nodes he wishes to monitor for the exercise.

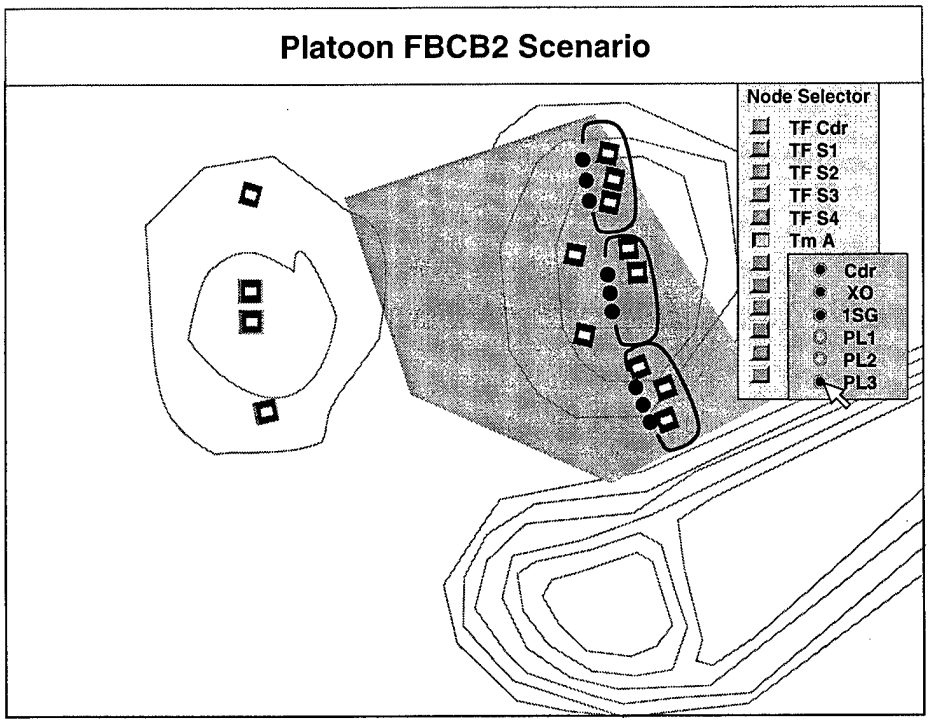


Figure 8. Selecting player nodes to be viewed during an exercise.

10. Enable Time-taging of Voice Tactical Communications and Trainer Comments

The TAF analyst should be able to time-tag voice communications at his individual TAF workstation by simply pointing and clicking his mouse. He should also be able to enter information provided by his counterpart OC.

Rationale: Time-tagging player voice communications eliminates the time-consuming procedure whereby the analyst writes down the time and tactical net for a specific voice transmission, and then manually locates the transmission in an audio tape or datalogger file for replay. There are occasions when the IS is unable to provide data on player activities. When these situations arise, OCs must observe the tactical event and report their observations to the TAF analyst. OC observations are critical during the planning and preparation phases of the tactical operation (i.e., rehearsal results requiring adjustments or refinements to the plan) and during logistical operations (i.e., logistical package [LOGPAC] timeliness and inventories). A capability that permits the TAF analyst to enter OC observations into the workstation to

complement IS data permits development of a complete picture of BLUFOR performance.

Example: Figure 9 shows the analyst time-tagging a voice contact report, causing the workstation to plot the report on the timeline. When the analyst clicks on the voice contact report annotation on the timeline, the TAF workstation plays back a 3-minute audio clip of the voice traffic. By interfacing with a dialogue box, the analyst can manually extend or reduce the duration of the playback.

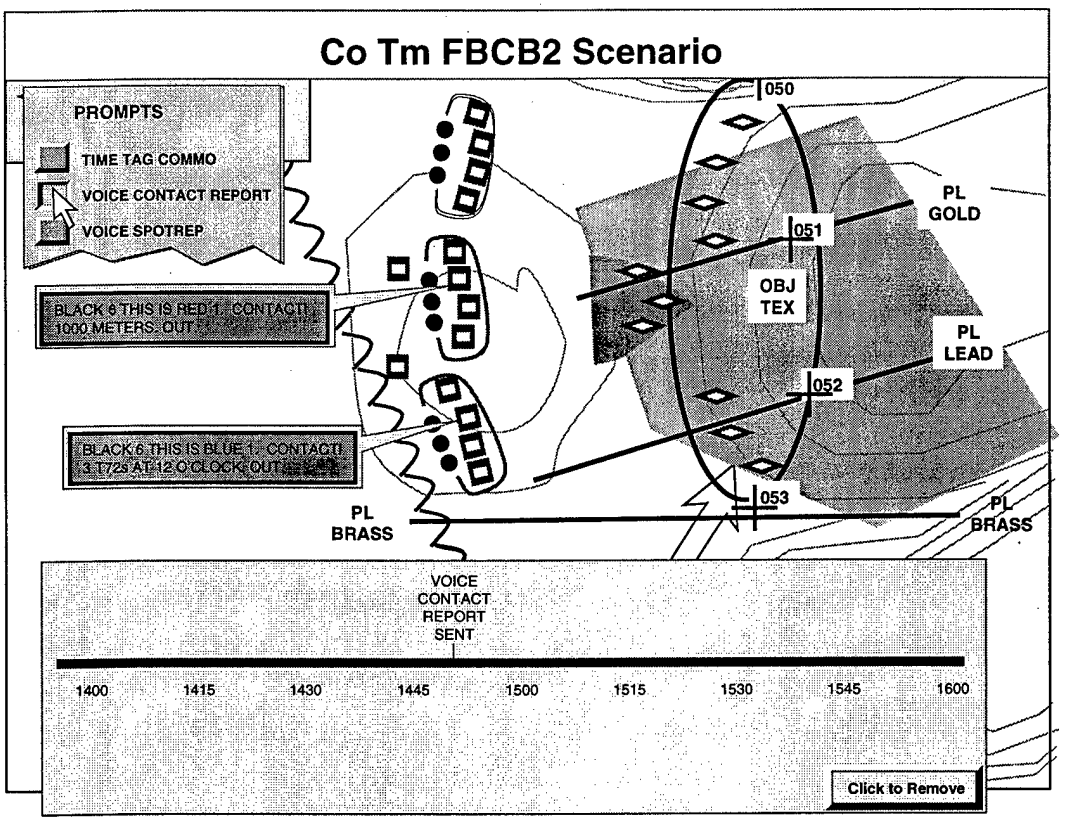


Figure 9. Time-tagged voice communications.

Example: Figure 10 shows the TAF analyst entering the date time group (DTG) for a LOGPAC resupply based on OC observations.

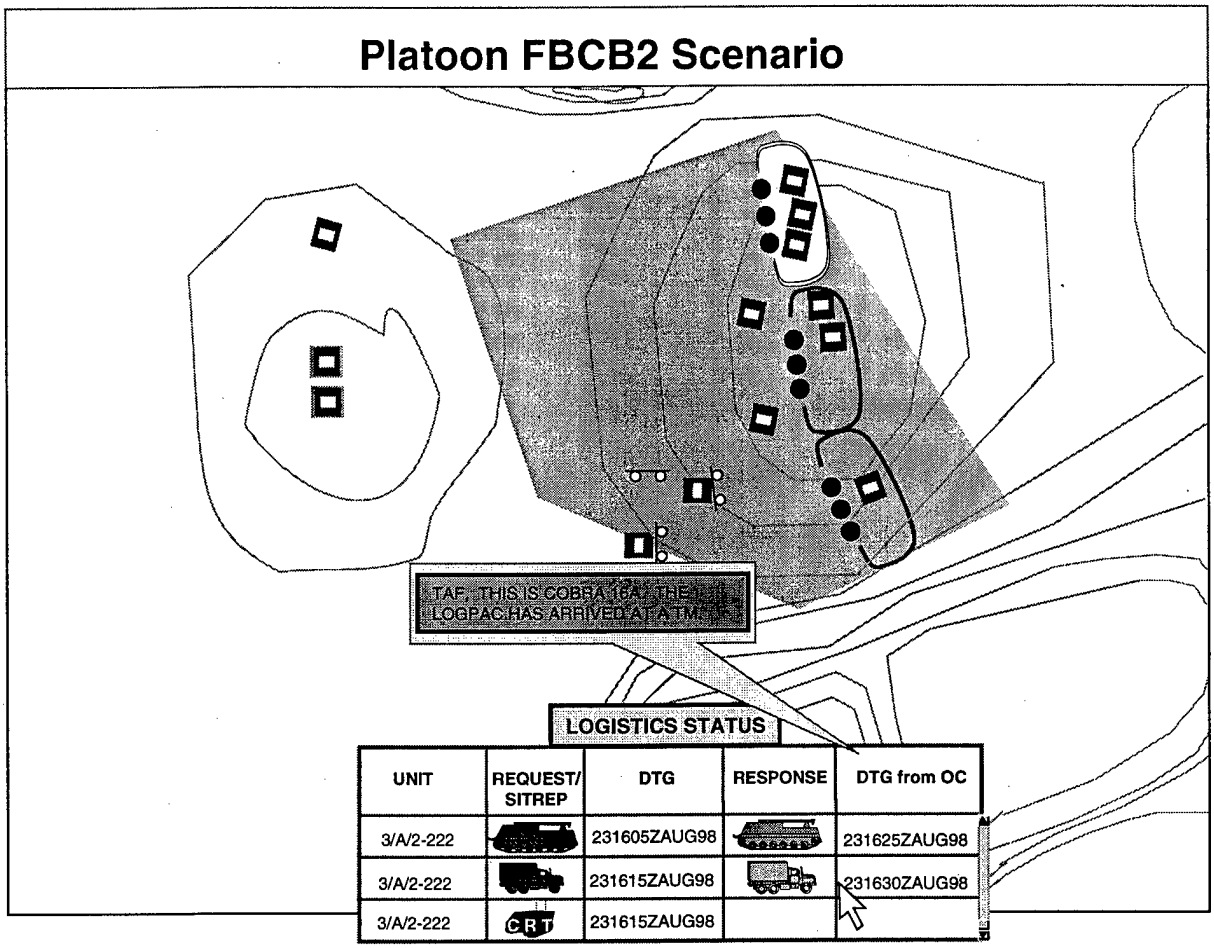


Figure 10.Screen allowing operator to enter time-tagged OC observations.

11. High-resolution Voice-Recognition and Automated Voice-to-Text Transfer

Since BLUFOR will use voice communications predominantly after contact with the enemy, the IS requires high-resolution voice-recognition and voice-to-text capabilities. The IS should provide time-stamped text versions of voice transmissions from multiple nets (i.e., the battalion operations and intelligence [OI], brigade OI and battalion command nets).

Rationale: The voice-to-text capability will permit TAF workstation artificial intelligence and analysts to search the content of voice communications by key-word search. For example, the Bn TF S2 analyst may wish to perform a search for

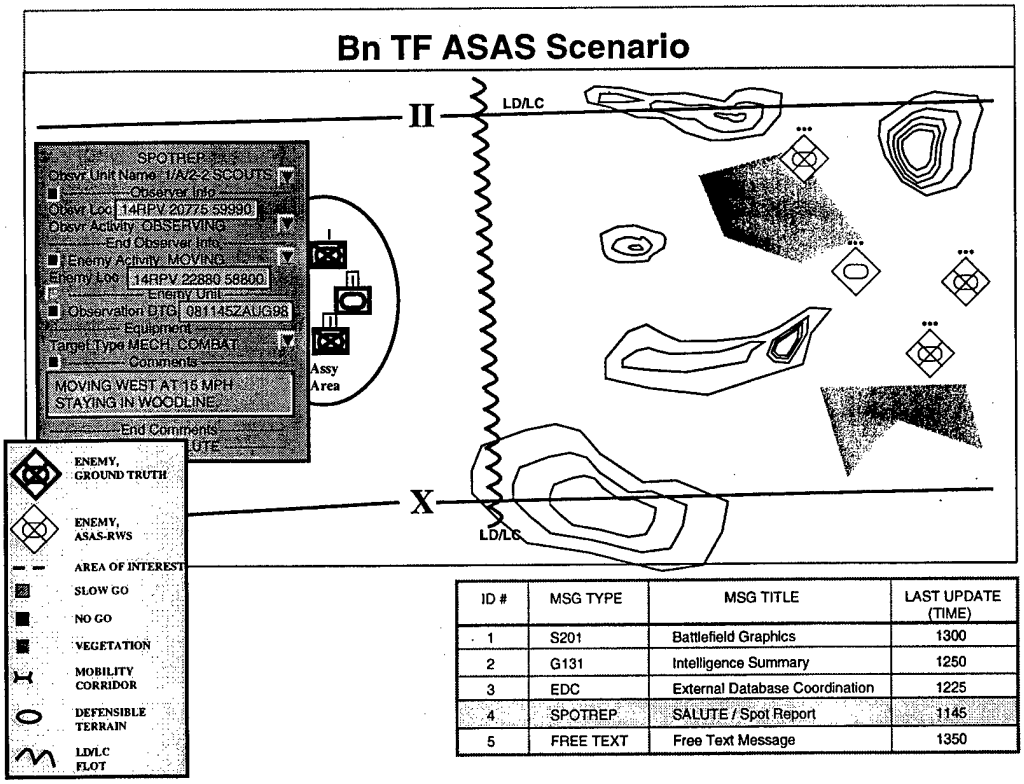
all voice transmissions on the battalion OI net that contain the phrase: "spot report." The Bn TF S3 may wish to review all transmissions on the battalion command net that mention "Check Point 32" between LD time and the assault on the objective. A text-search capability will also permit key-word searches of plain-text digital messages.

12. Single Workstation Support for all ATCCS

The IS should receive and display ATCCS and FBCB2 digital messages. All TAF workstations should have the capability to support MCS, ASAS, AFATDS, FAADC2I, CSSCS, FBCB2 and displays from other applicable tactical digital systems.

Rationale: The TAF analyst will choose the digital system(s) he wishes to view based on the system used by his BLUFOR counterpart. There will be occasions when the TAF analyst or an artificial intelligence (AI) will crosswalk information from one digital system to another.

Example: Figure 11 shows the TAF analyst observing an ASAS enemy situation overlay and a FBCB2 spot report simultaneously.



ID #	MSG TYPE	MSG TITLE	LAST UPDATE (TIME)
1	S201	Battlefield Graphics	1300
2	G131	Intelligence Summary	1250
3	EDC	External Database Coordination	1225
4	SPOTREP	SALUTE / Spot Report	1145
5	FREE TEXT	Free Text Message	1350

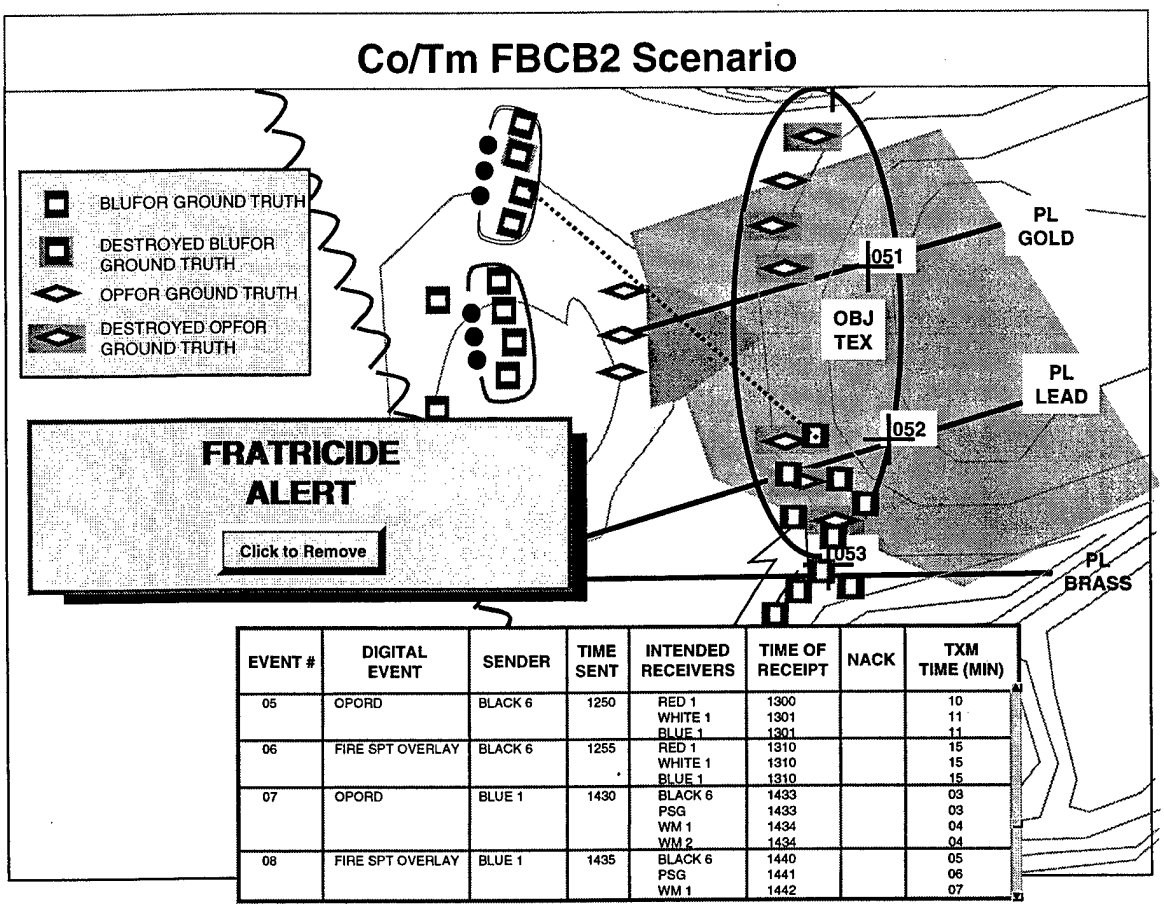
Figure 11. Screen allowing ASAS enemy situation overlay and a FBCB2 spot report to be viewed simultaneously.

13. Automatically Alert User to Significant Communication Events

The TAF workstation should automatically alert the TAF analyst to player actions or inactions based on artificial intelligence (AI) rule sets developed from OC and TAF analyst interviews. For example, the analyst may wish the workstation to alert him of near fratricide and fratricide incidents, disparities in SA among BLUFOR players, or to major disconnects between perceived and ground-truth.

Rationale: This capability allows the analyst to focus on one or more activities while the workstation monitors other activities in the background. For example, the analyst may be viewing player activity in one geographical area when a fratricide occurs at a location completely off his screen. Without a system alert notifying the analyst of the fratricide, the analyst would be unaware of the incident. The analyst should be able to view the digital activities of one BLUFOR node, while the system is continuously checking for uniformity in SA among other nodes and alerting the analyst to inconsistencies in C2 information among BLUFOR players.

Example: Figure 12 shows the workstation alerting the analyst to its detection of a firing vector between one BLUFOR vehicle and another.



EVENT #	DIGITAL EVENT	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	TXM TIME (MIN)
05	OPORD	BLACK 6	1250	RED 1 WHITE 1 BLUE 1	1300 1301 1301		10 11 11
06	FIRE SPT OVERLAY	BLACK 6	1255	RED 1 WHITE 1 BLUE 1	1310 1310 1310		15 15 15
07	OPORD	BLUE 1	1430	BLACK 6 PSG WM 1 WM 2	1433 1433 1434 1434		03 03 04 04
08	FIRE SPT OVERLAY	BLUE 1	1435	BLACK 6 PSG WM 1	1440 1441 1442		05 06 07

Figure 12. Display alerting trainer to fratricide incidents.

Example: In Figure 13, the TAF workstation detected a disparity between ground-truth and perceived-truth OPFOR dispositions and alerted the analyst. The analyst responded to the alert dialogue box and the workstation presented the display below contrasting OPFOR ground-truth positions with enemy dispositions in an ASAS overlay.

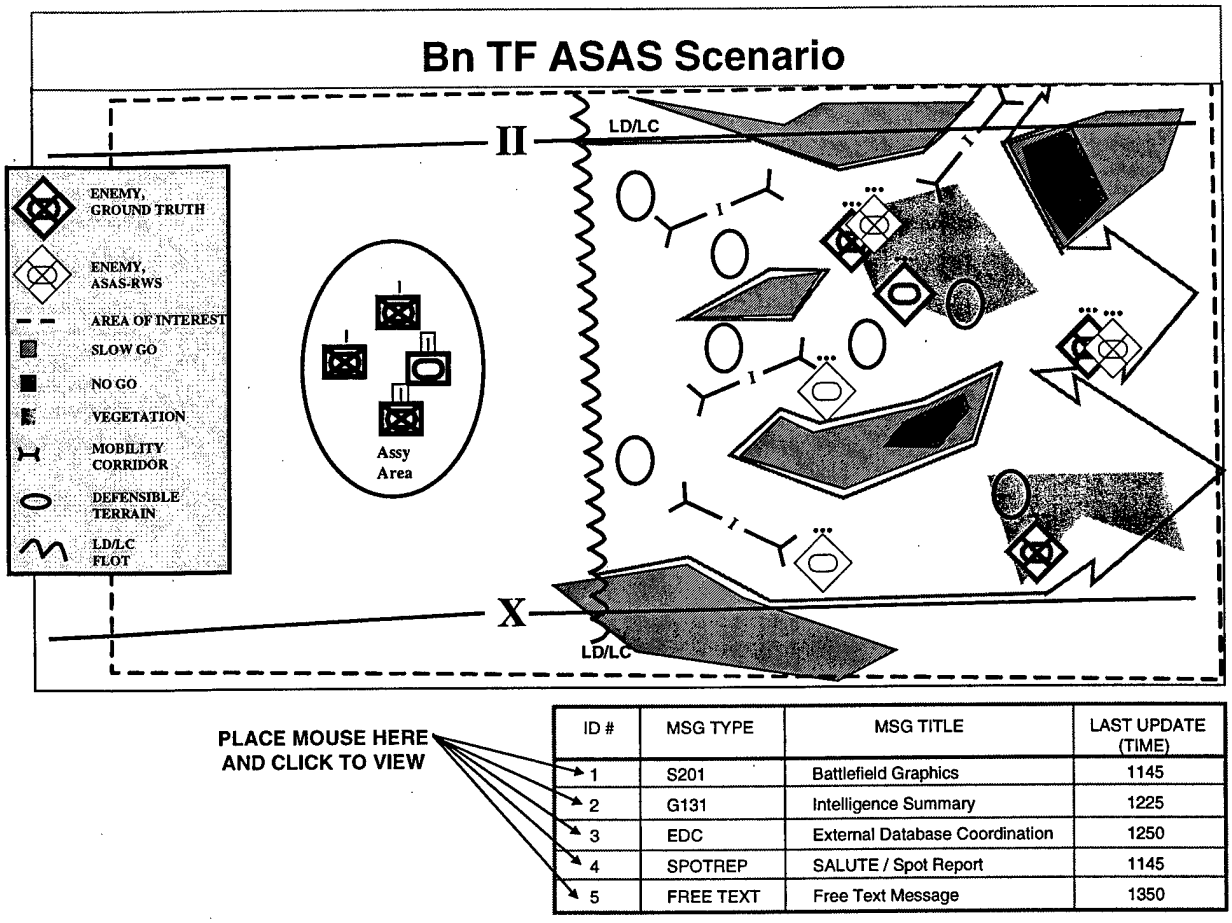


Figure 13. Display alerting trainer to disparities between BLUFOR perceived-truth and ground-truth.

14. Alert User to Unit Video Teleconferences (VTC) and Support User Monitoring of VTC

The TAF workstation should alert the analyst to BLUFOR video teleconferences (VTC) and permit the analyst to monitor VTC at his workstation.

Rationale: During the TF XXI AWE, the brigade commander conducted a VTC to inform all Bn TF commanders and supporting units of his intent for the pending tactical operation. TAF Analysts should be able to view these collaborative sessions so they may prepare video clips to support AARs.

15. Describe Timing and Impacts of OPFOR Jamming

The IS should detect when OPFOR is jamming BLUFOR communications, post the timeline indicating when the jamming started and when the jamming ceased, and graph the effects of the jamming.

Rationale: A unit's ability to work around jamming of digital and voice communications can be a critical factor that heavily influences the tactical outcome of the operation. The TAF analyst must be able to assess the effects of OPFOR jamming on BLUFOR operations and pass observations to his counterpart OC, so the OC may coach the unit in techniques to overcome the disruption of C2 communications.

Example: In Figure 14, the workstation posts OPFOR jamming activities to the timeline. The analyst notices these annotations to the timeline and directs the system to graph the effects of OPFOR jamming by selecting the desired BLUFOR tactical net and entering a time period into a computer dialogue box. The workstation graphs OPFOR jamming and BLUFOR digital and voice transmissions over the time period designated by the analyst. The graph reveals that during the period of OPFOR jamming, BLUFOR digital retransmissions escalated dramatically. The graph also shows that the unit transitioned from digital to voice communications over a period of one hour in an attempt to work around the jamming. This information combined with annotations on the timeline reveal why the Bn TF required five hours to transmit the OPORD to subordinate and supporting units.

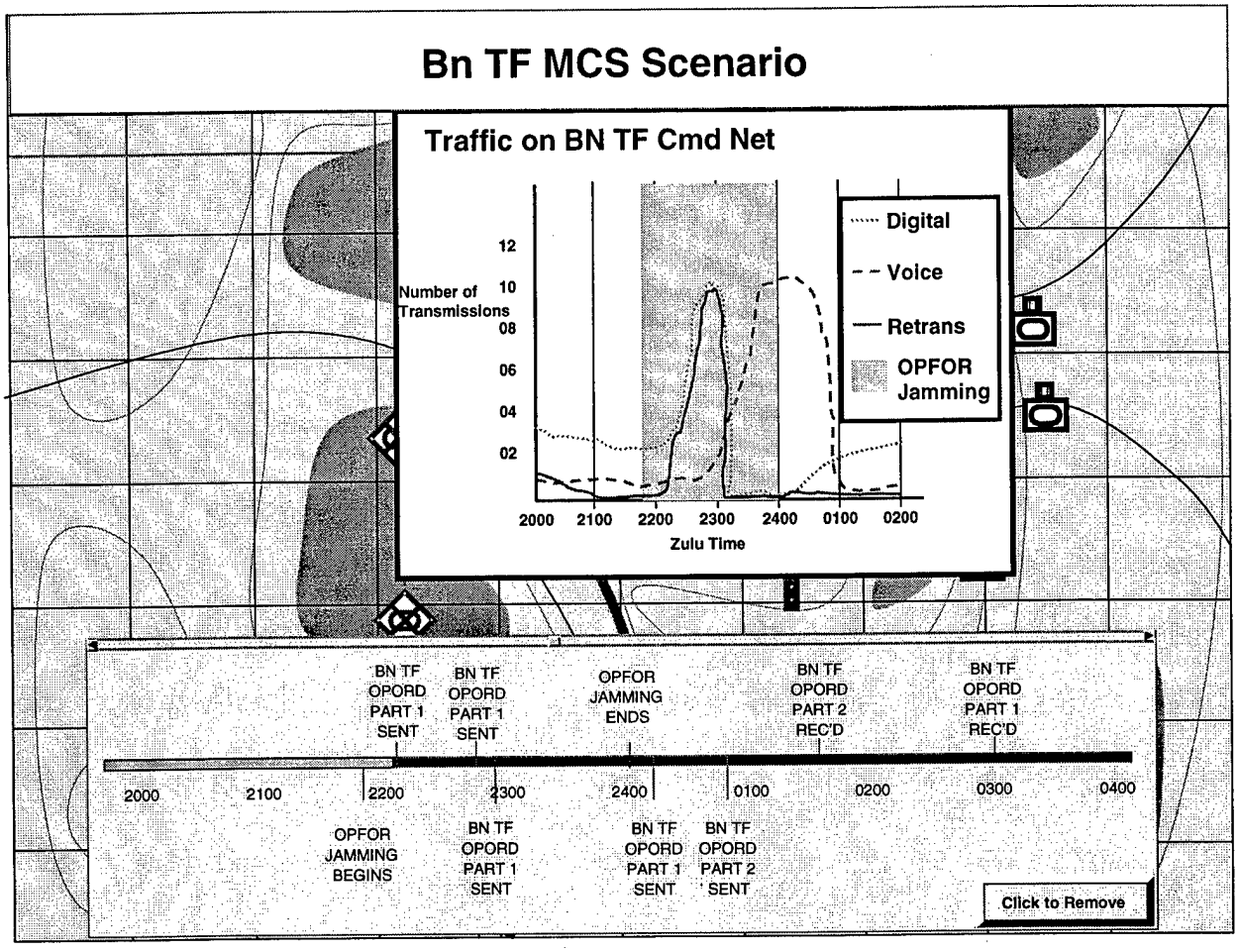


Figure 14. Graph showing the timing and effects of OPFOR jamming.

16. Support Operator Performance of Exercise Control and Feedback Tasks Best Performed by a Human

The TAF workstation should provide interactive checklists to the analyst for those training analysis tasks that the human can best perform, permitting the analyst to draw on top-down views of player plans or activity to make key teaching points.

Rationale: There are collective MTP tasks that are too ill-structured for an AI capability to assess as GO/NO GO. Ill-structured domains require cognitive flexibility to "adaptively reassemble diverse elements of knowledge to fit the particular needs of a given understanding or problem solving situation" (Spiro & Jehng, 1990). Assessing unit performance during diverse tactical situations a training unit will encounter in free-play, force-on-force exercises requires an evaluator with

exceptional knowledge of TTPs, experience gained from many exercises and an analytical capability that often only the human can provide. When it is best for the TAF analyst vice AI to make the call on unit performance, the TAF workstation should provide checklists to assist the analyst in systematically applying his knowledge in the assessment of unit performance. Checklists augmented with a drawing capability will permit analysts to identify and highlight key teaching points for the AAR.

Example: In Figure 15, the workstation provides the analyst an interactive checklist to assess targeting in the fire support plan. A drawing capability allows the analyst to annotate targeting deficiencies.

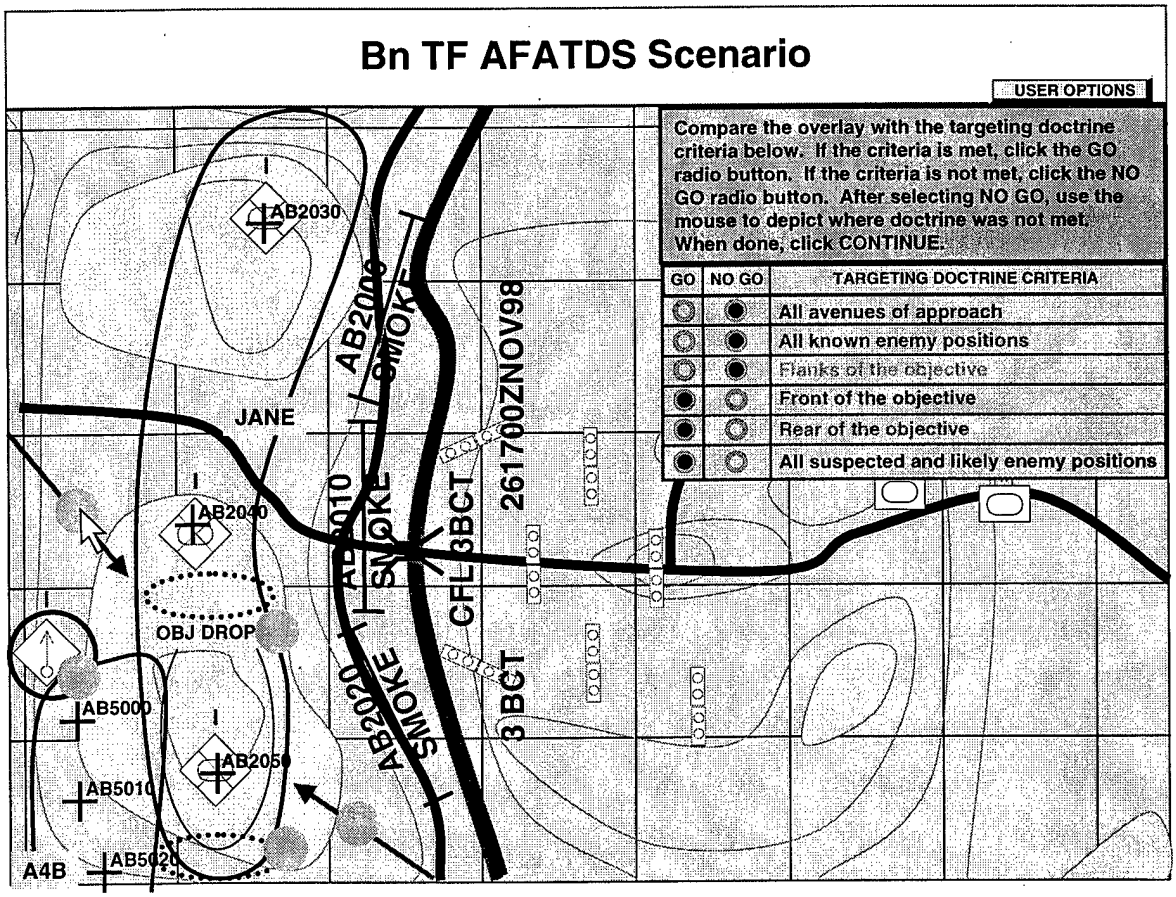


Figure 15. Interactive checklist supporting performance assessment by a subject matter expert.

17. Support Analysis with User-Selectable Preformatted Queries and User-Programmable Search Queries

The TAF workstation should support analyst queries for information and generate reports to facilitate performance assessment based on user-programmable search parameters. The workstation should also support the analyst with user-selectable preformatted queries.

Rationale: On occasions, the analyst will have a need to query various digital nodes for information. For example, the analyst may wish to thread a timeline displaying the significant events for a particular item of interest (i.e., "I want to know all logistics actions that pertain to Work Order No.12345"). The workstation should also provide preformatted queries to obtain information to support standard, recurring AAR products.

Example: In Figure 16, the analyst interfaced with a dialogue box to execute a preformatted query. Based on the analyst's input, the workstation searched the information at multiple digital nodes and produced a report revealing planning deficiencies by subordinate and supporting units for execution of the Bn TF fire support plan.

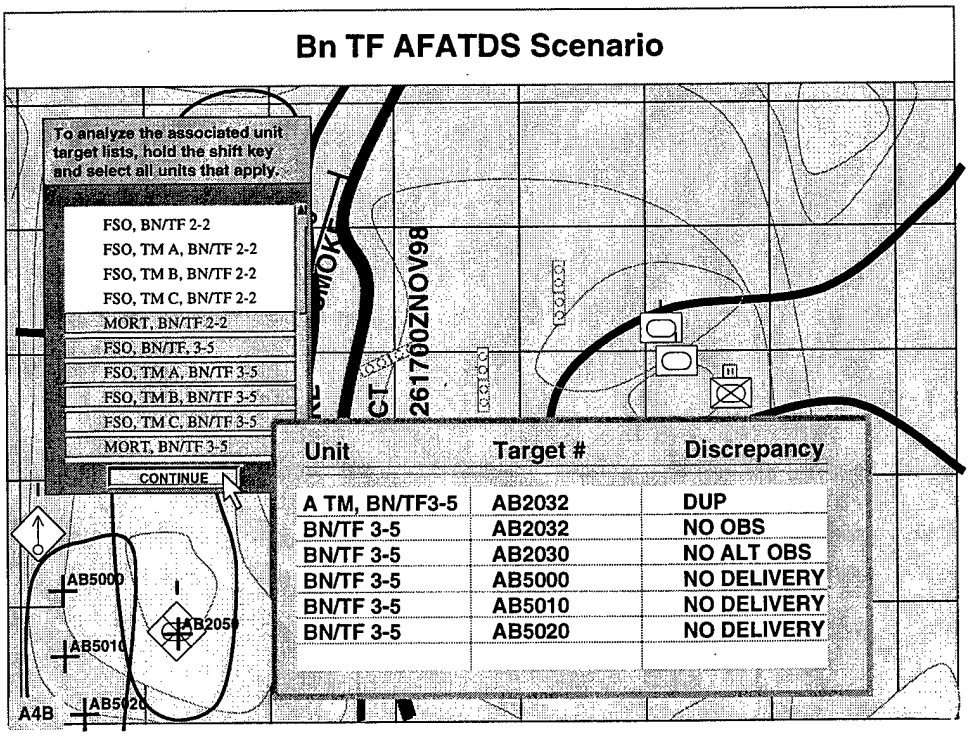


Figure 16. Preformatted queries for generating reports.

18. Support Statistical Analysis of Unit Planning, Preparation, Execution, and Reconstitution Phases

The TAF workstation should perform calculations to support routine statistical analyses of BLUFOR planning and actions.

Rationale: TAF analysts have routine requirements for statistical data during the planning, preparation, execution and reconstitution phases of an exercise. For example, the analyst will want to know the BLUFOR to OPFOR force ratio, mean-kill-to-firings ratio and mean kill range for selected weapons at various times as the exercise progresses. Manual calculations distract the analyst from his observation and performance assessment duties. The TAF workstation can perform these calculations dynamically and provide the results to the analyst on-the-fly during the exercise.

Example: In Figure 17, the analyst directed the workstation to analyze three planned smoke targets for engagement by selected artillery and mortar units. The workstation performed calculations based on forecast weather conditions and concluded that there was insufficient ammunition to sustain smoke for the prescribed time on one of the planned targets.

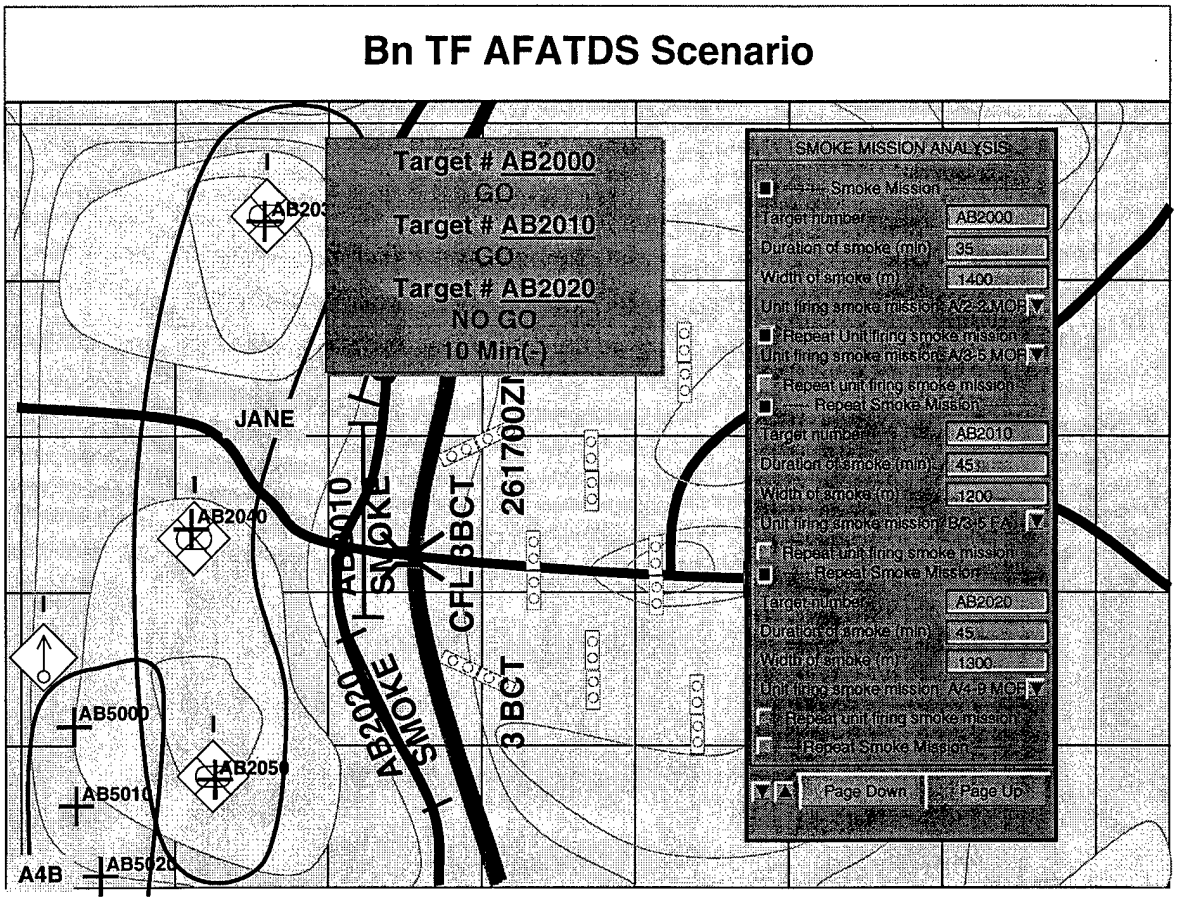


Figure 17. Use of automated analyses to identify shortfalls in ammunition to support planned targets.

Example: In Figure 18, the workstation prepares a statistical display contrasting BLUFOR perceived-truth data from LOGSITREPS with OC-provided ground-truth data on equipment readiness.

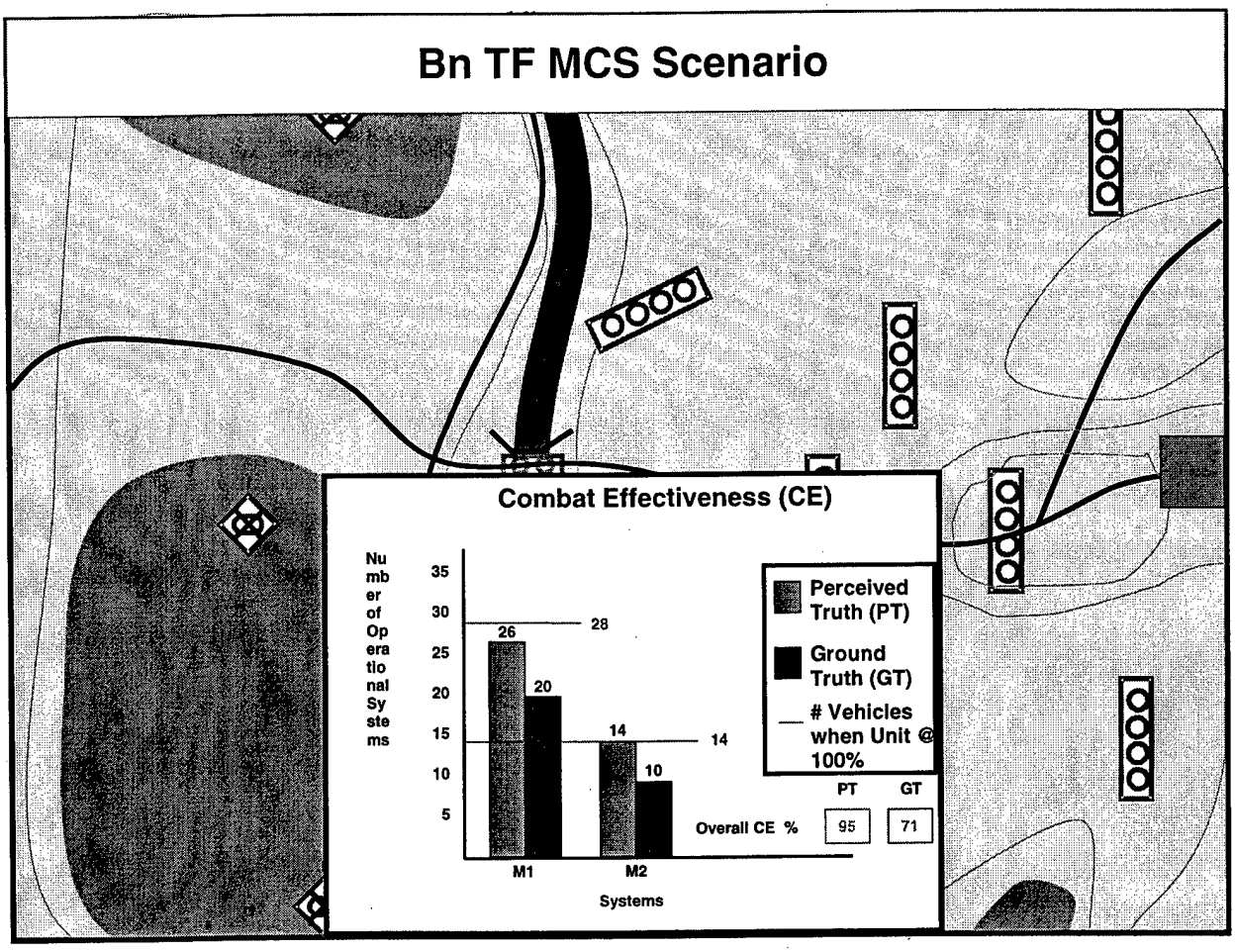


Figure 18. Example of a statistical display comparing number of M1 and M2 systems that are actually operational (ground-truth) with number of systems BLUFOR perceives to be operational (perceived-truth).

19. Automate Production of Candidate AAR Products and Support Aid Editing, Manual Production and Customization

The TAF workstation requires an AI capability to automate the preparation of candidate AAR products similar to those shown in this study's illustrations. The workstation should provide the analyst the capability to review and edit automated AAR products and support the analyst's preparation of manual/custom AAR products as well.

Rationale: Without additional manning, the TAF analyst in the live training environment cannot prepare AAR products on the unit's employment of multiple digital systems to command and

control a combined arms operation in addition to his other duties (Advancia, 1998). An AI-capable TAF workstation can better perform the mundane tasks of collecting data and constructing AAR products using well-defined AAR templates. This capability frees the analyst to focus on assembling the best AAR products to make the OC's key teaching points.

20. Automatically Generate Candidate Discussion Points for AARs

The TAF workstation should automate the production of OC discussion outlines, which address the significance of each AAR product.

Rationale: Depending on the echelon of the AAR (Bn TF, Co Tm or platoon), the TAF will produce a few to over a hundred AAR products. For other than mandatory AAR products, it is difficult to determine the significance of an AAR display without a note explaining the major teaching point(s) the display supports. This is particularly true for top-down computer-generated displays. The AI supporting the TAF workstation should produce discussion outlines linked to AAR products that:

-- Allow the trainer to enter information tailored to the actual circumstances portrayed by the display (what happened).

-- Provide system-generated, open-ended questions to promote discussion among members of the AAR audience on why it happened.

-- Provide system-generated information on desired performance to support discussions on how to improve.

Example: Figure 19 provides a sample discussion outline.

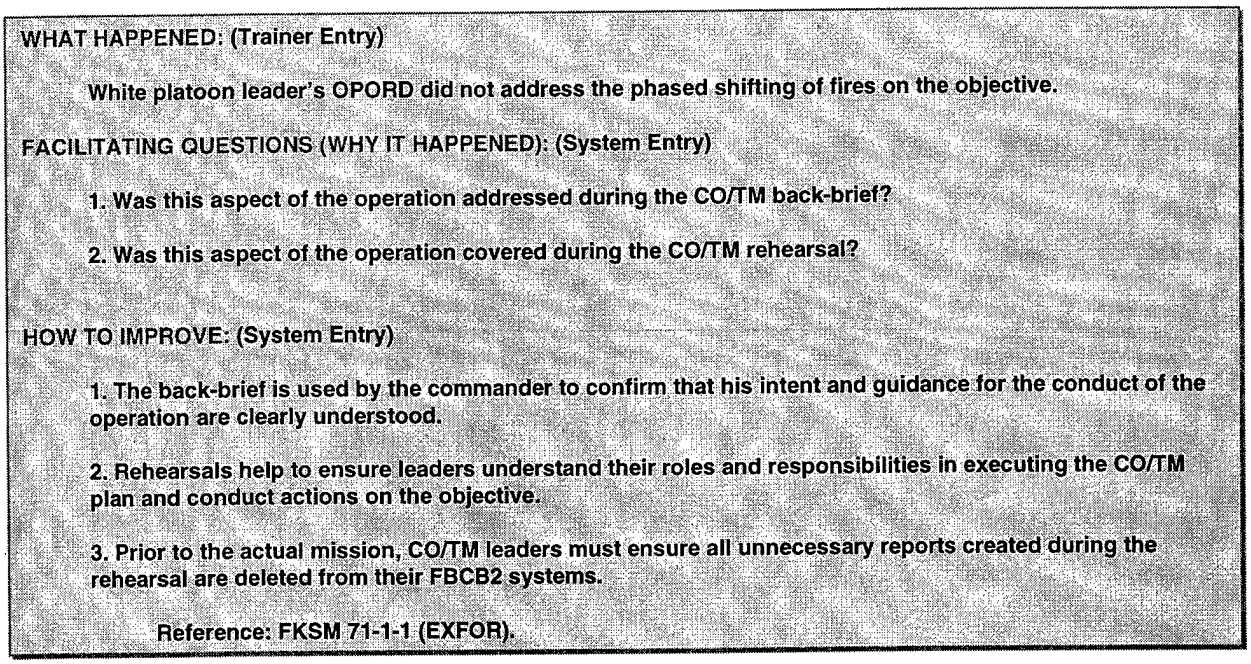


Figure 19. Automated preparation of discussion outlines for an AAR.

Summary and Discussion

Defining Instrumentation Capabilities

OCs and analysts perform many control functions in order to provide units with the intrinsic feedback needed to cue and guide performance during force-on-force exercises. They must also perform many functions to provide units with extrinsic feedback regarding performance. Digitization of the battlespace increases the amount of work required to support intrinsic and extrinsic feedback for C4I activities. The advent of digitization makes it especially difficult for platoon and company level OCs to track the flow of information within the unit they are observing and between this unit and higher, adjacent and supporting units.

The purpose of this study was to provide information about how automation can be applied to support exercise control and feedback functions when training digitized units. We conducted this study at the request of ATMD, the Army organization responsible for defining requirements for live training instrumentation systems for use at CTCs and at homestations. ATMD intends to use the results of this study to define requirements for an instrumentation system that can help train digitized units.

This study was conducted in two phases. In the first phase, we interviewed approximately seventy OCs and analysts from the NTC that had participated in the Force XXI AWE during which the EXFOR trained using digital systems. These interviews provided information about the challenges faced by trainers of digitized units and potential solutions to these challenges.

In the second phase, we examined emerging digital TTPs, based on lessons learned by the EXFOR, to identify training points that might be addressed by workstation displays in support of training. We designed and illustrated forty-two displays addressing units from platoon through battalion task force level and encompassing the AFATDS, ASAS, MCS, and FBCB2 digital systems. We examined each display to decide the capabilities a workstation would require to create that display, and we developed a consolidated list of twenty capabilities a workstation would need to create the forty-two sample displays.

Workstation Capabilities Supporting Training of Digitized Units and Issues to be Addressed When Writing Requirements

During the Force XXI AWE NTC OCs and analysts encountered a number of problems tracking the flow of digital communications and preparing AAR aids that illustrated use of digital systems. For the most part, OCs did not want to be given a system that they could personally use to monitor digital communications. Instead, they preferred that TAF analysts be provided with an instrumentation system that the analyst could use to monitor digital communications. Analysts, on the other hand, pointed out that they might require additional personnel to monitor digital communications.

This study described and defended twenty capabilities that a workstation should have to support the training of digitized units during force-on-force exercises. The capabilities are discussed briefly below, organized in terms of whether they support exercise control, feedback, or control and feedback.

Capabilities Supporting Exercise Control

To support exercise control functions, a workstation should be able to transmit as well as receive messages so that trainers can play the role of higher, supporting, and adjacent units. A workstation should alert the trainer when a significant digital communications event occurs or when the BLUFOR conducts a VTC. Another critical workstation capability is that of being able to quickly change nodes in order to transmit messages from an appropriate node (e.g., from the Fire Support Officer's node to simulate the role of a Fire Support Officer).

Capabilities Supporting Feedback

To help users address a growing workload, the workstation should automatically generate candidate AAR products, help the user manually create AAR products, and help the user edit the automatically or manually generated products. This is a capability that has been implemented in a ground-truth AAR system developed for use in the virtual domain (Brown, Wilkinson, Nordyke, Riede, Huyssoon, Aguilar, Wonsewitz, and Meliza, 1997), but it has not been implemented for C4I performance. Although this study identified and illustrated many of the C4I AAR aids that might be produced, preparing a more complete listing of potential C4I AAR aids was beyond the scope of this study.

The workstation should also automate the production of OC discussion outlines. This study provides many examples of these outlines which can be used by OCs to ask a series of questions that will help a unit decide why a particular significant event occurred and what actions can be taken to improve or sustain performance in the future. These questions are tied to the specific aspects of unit C4I performance illustrated in a particular AAR aid.

The workstation should allow the user to time-tag voice tactical communications and trainer comments so that these communications can be called up and played to support the AAR. Since lower units are expected to use voice communications after contact, high resolution voice-recognition and voice-to-text translation capabilities are important in reducing the workloads of trainers. The ability of existing voice recognition and translation systems to meet these needs is a material developers concern and beyond the scope of the current study.

The workstation should also support statistical analysis of unit planning, preparation, execution, and reconstitution phases of a mission. The job of defining all of the statistical analyses to be supported are beyond the scope of the present study; however, it is important that these analyses be specified within the scope of the instrumentation procurement process.

Capabilities Supporting Exercise Control and Feedback

The workstation should help users navigate through the digital message (and possibly voice) traffic by helping users find messages of potential interest. A workstation should provide a tabular log containing information about messages useful in deciding whether the content may be of interest (e.g., total transmission time), and it should provide a timeline showing when selected message types are sent and received. For both the log and the timeline, the workstation should give the user the capability to call up the content of a message that appears to be of interest. This study identifies many of the elements of information about messages that could be provided in a log file to help the user quickly identify messages of interest and describes how the information can be important. This study also identifies communication events that can be annotated on a timeline and describes the importance of these events. Prior to implementing these log and timelines, additional thought should be given to the question of whether there are additional message parameters that need to be

addressed by a log and additional types of events that need to be addressed by a timeline.

A workstation that simply mirrors the displays of a unit's digital systems leaves the user with a heavy workload. The workstation should present information in a way that readily supports performance measurement and AAR presentations rather than trying to duplicate digital displays. For example, the workstation should integrate the display of digital command/control and SA data with ground-truth data from an IS. Rather than addressing information sent and received by a single type of ATCCS or FBCB2, the workstation should be able to address information from all systems employed at battalion level. This means that the workstation must be capable of monitoring TOC local area networks, as well as digital messages transmitted wirelessly on the internet.

The workstation should be designed so that the fielding of future versions of digital systems requires as little modification of the workstation as possible. Perhaps ideally, the workstation will not require modification unless there is a change in the format of messages sent between or among digital systems. The specific technologies to be used in implementing such a system is an issue for material developers and is outside the scope of this study.

A well designed workstation will automate exercise control and feedback functions that can be effectively performed by software and leave functions requiring subject matter expertise up to humans, but it should also use automation to help users perform the human functions by performing certain tedious tasks. For example, certain aspects of unit performance can be evaluated more effectively by a subject matter expert (SME) than by software; however, software can assist the SME by automatically displaying a set of standards for evaluating unit performance when the software decides the situation calls for the application of these standards.

The results of this study help to improve the Army's understanding of how digitization will influence OC and analyst functions. In addition, this study describes and illustrates how an instrumented workstation can be used to assist trainers and analysts in performing these functions. Although the study was conducted to support the live training domain, most of the findings are also relevant to the virtual and constructive domains.

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APPENDIX A:
LIST OF ABBREVIATIONS AND ACRONYMNS

1SG	First Sergeant
A2C2S	Army Airborne C2 System
A3RM	Advanced After Action Review Media
AAR	After Action Review
ABMOC	Air Battle Management Operations Center
ADA	Air Defense Artillery
AFATDS	Advanced Field Artillery Tactical Data System
AI	Artificial Intelligence
ARI	Army Research Institute
ARTEP	Army Training and Evaluation Program
ASAS	All Source Analysis System
ASAS-RWS	ASAS-Remote Workstation
ATCCS	Army Tactical Command and Control System
ATSC	Army Training Support Center
AVTOC	Aviation TOC
AWACS	Airborne Warning and Control System
BLUFOR	Friendly Forces
Bn TF	Battalion Task Force
BOS	Battlefield Operating System
BSA	Brigade Support Area
C2	Command and Control
C4I	Command, Control, Communications, Computers and Intelligence
COA	Course of Action
Co Tm	Company Team
CRIOT	Cognitive Requirements for Information Operations Training
CSSCS	Combat Service Support Control System
CTC	Combat Training Center
DSSU	Dismounted Soldier System Unit
DTG	Date Time Group
DTOC	Division Tactical Operation Center
EMCC	Exercise Management and Control Cell
EXFOR	Experimental Force
FAAD GBS	Forward Area Air Defense Ground-Based Sensor
FAADC2	Forward Area Air Defense Command and Control
FAADC2I	Forward Area Air Defense Command, Control and Intelligence
FBCB2	Force XXI Battle Command Brigade and Below
FO	Forward Observer
FRAGO	Fragmentary Order
FS	Fire Support
FSB	Forward Support Battalion

FSO	Fire Support Officer
GBS/BADD	Global Broadcast System/Battlefield Awareness Data Dissemination
GT	Ground Truth
HMMWV	High Mobility Multi-purpose Wheeled Vehicle
HTU	Hand-Held Terminal Unit
IBM	International Business Machines
ID	Identification
INT	Intelligence
IO	Information Operations
IPB	Intelligence Preparation of the Battlefield
IS	Instrumentation System
JTF	Joint Task Force
LCD	Liquid Crystal Display
LD	Line of Departure
LOGPAC	Logistics Package
LOGSITREP	Logistical Situation Report
MAJ	Major
MCS	Maneuver Control System
MS	Mobility/Survivability
MTP	Mission Training Plan
NACK	Non-Acknowledgement
NAI	Named Area of Interest
NTC	National Training Center
OC	Observer/Controller
OCCS	Observer/Controller Communications System
OI	Operations and Intelligence
OPFOR	Opposing Forces
OPORD	Operations Order
OPTEC	Operational Test and Evaluation Command
PC	Personal Computer
PERSITREP	Personnel Situation Report
PM FATDS	Project Manager FATDS
PSG	Platoon Sergeant
PT	Perceived Truth
RSTA	Reconnaissance, Surveillance and Target Acquisition
SA	Situational Awareness
SHTU	Secure Hand-Held Terminal Unit
SICPS	Standard Integrated Command Post Shelter
SITREP	Situation Report
SPOTREP	Spot Report
TAAF Aids	Training Analysis and Feedback Aids
TAF	Training Analysis Facility
TC	Tank Commander
TF XXI AWE	Task Force XXI Army Warfighting Experiment
THP	Take Home Package

TOC	Tactical Operations Center
TRADOC	US Army Training and Doctrine Command
TTP	Tactics, Techniques and Procedures
VTC	Video Teleconference
WFA	Warfighters Associate
WO	Warning Order
XO	Executive Officer

APPENDIX B:
ADVANCED FIELD ARTILLERY TACTICAL DATA SYSTEM (AFATDS) BATTALION TRAINING SCENARIO

We used various sources for completing the AFATDS BATTALION/TASK FORCE TASK MATRIX. We found information for the TASK and KEY ELEMENTS column in Chapter 5 of FKSM 71-2-1-(EXFOR), *MTP Mission Training Plan for the EXFOR Digitized Tank and Mechanized Infantry Battalion Task Force.* We used FKSM 71-2-1 (EXFOR), *The Digitized Heavy Battalion;* FM 6-20-10, *Targeting;* and FM 6-71, *The Combined Arms Commander's Guide to Fire Support,* to complete the APPLICABLE TTP column. We completed the AFATDS INPUT AND OUTPUT column with information taken from ST 6-3, *Tactics, Techniques, And Procedures For The Advanced Field Artillery Tactical Data System (AFATDS) In Division XXI.*

The intent of each display illustrated in this appendix is stated below.

Display 1. INTENT: Show TAF Analyst ability to view plain text messages.

Display 2. INTENT: Show TAF Analyst ability to analyze the Bn TF Fire Support Overlay.

Display 3. INTENT: Show TAF Analyst ability to analyze top-down fire planning and bottom-up target refinement.

Display 4. INTENT: Show TAF Analyst ability to analyze smoke missions.

Display 5. INTENT: Show TAF Analyst ability to compare and analyze the target lists of selected units.

Display 6. INTENT: Show TAF Analyst ability to turn-on/turn-off firing vectors.

AFATDS Battalion Task Force Task Matrix

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
EMPLOYEE FIRE SUPPORT (7-1-3907). (Bn TF CDR and staff plan combat operations, using ABCS assets) FKSM 71-2-1-(EXFOR)-MTP, p. 5-70.	1.c. Include a commander's concept that clearly addresses a scheme and task/priorities for supporting fires.	Essential fire support tasks (EFST) are the vehicle used to express the commander's guidance for fire support. A fully developed EFST has a task, purpose, method and endstate. FKSM 71-2-1, p. 7-5.	As in manual fire planning, with AFATDS different agencies are responsible for providing and updating certain pieces of information. When these pieces are put together in one database, they become a whole tool capable of executing our commanders intent for fires. Often, when a plan is received from higher, the subordinate element will build from the higher guidances, then modify them to accomplish his commanders intent for fires. ST 6-3, p. 5-2.
EMPLOYEE FIRE SUPPORT (7-1-3907). (Bn TF CDR and staff plan combat operations, using ABCS assets) FKSM 71-2-1-(EXFOR)-MTP, p. 5-70.	1.d. Provide a fire support matrix, developed and executed in AFATDS.	The fire support execution matrix is the blueprint for executing the fires portion of the OPOORD and should correspond to the synchronization matrix. The BN/TF fire support execution matrix is a stand-alone document. It is detailed enough for BN/TF and CO/TM FSOs to assume control and execute the BN/TF CDR's intent for fire support. FM 6-20-10, p. 5-6.	The Fire Support Execution Matrix window allows the operator to edit the text matrix that contains the Fire Support Execution Matrix. It can only be accessed through the planning situation. You can add or delete units and add or delete phases. ST 6-3, p. 5-30.
EMPLOY FIRE SUPPORT (7-1-3907). (FSO and staff develop a fire support plan). FKSM 71-2-1-(EXFOR)-MTP, p. 5-70.	2.a. annotate critical graphic control measures in AFATDS overlays and build essential information in AFATDS report and text files.	The FBCB2 fire support overlay is not projected to be able to show critical graphic control measures. A technique is to use the FBCB2 overlays to disseminate information down and pass all of the bottom-up refinements through AFATDS. Once the refinements are reviewed, approved, and entered into AFATDS, the FSO can create an updated overlay to disseminate back down. The FSE needs time to update both systems. FKSM 71-2-1, pp. 7-14 - 7-15.	First, cause the overlay to be annotated to appear. Click on the symbol to be annotated, and make the change. ST 6-3, pgs. 5-6, 5-7.

AFATDS Battalion Task Force Task Matrix (Continued)

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
EMPLOY FIRE SUPPORT (7-1-3907). (BN/TF executes fire support, using AFATDS.) FKSM 71-2-1-(EXFOR)-MTP, p. 5-70.	4.a. Ensures that friendly fires stop or slow enemy movement.	Assessing the accomplishment or non-accomplishment of an EFST is a critical aspect of execution that keeps fires focused and synchronized with the maneuver plan. FKSM 71-2-1, p. 7-8.	The rounds required for a specific COA is based on enemy targets, target attack guidance, FS attack system characteristics, FS system preference table and an embedded classified planning rounds required matrix. ST 6-3, p. 5-11.
EMPLOY FIRE SUPPORT (7-1-3907). (BN/TF executes fire support, using AFATDS.) FKSM 71-2-1-(EXFOR)-MTP, p. 5-70.	4.b. Ensures that friendly fires sufficiently suppress enemy fires.	Assessing the accomplishment or non-accomplishment of an EFST is a critical aspect of execution that keeps fires focused and synchronized with the maneuver plan. FKSM 71-2-1, p. 7-8.	The rounds required for a specific COA is based on enemy targets, target attack guidance, FS attack system characteristics, FS system preference table and an embedded classified planning rounds required matrix. ST 6-3, p. 5-11.
EMPLOY FIRE SUPPORT (7-1-3907). (BN/TF executes fire support, using AFATDS.) FKSM 71-2-1-(EXFOR)-MTP, p. 5-70.	4.c. Ensures the volume of fires accomplish the desired task.	Assessing the accomplishment or non-accomplishment of an EFST is a critical aspect of execution that keeps fires focused and synchronized with the maneuver plan. FKSM 71-2-1, p. 7-8.	The rounds required for a specific COA is based on enemy targets, target attack guidance, FS attack system characteristics, FS system preference table and an embedded classified planning rounds required matrix. ST 6-3, p. 5-11.
EMPLOY FIRE SUPPORT (7-1-3907). (BN/TF executes fire support, using AFATDS.) FKSM 71-2-1-(EXFOR)-MTP, p. 5-70.	4.d. Ensure that friendly forces are not silhouetted by friendly FA smoke.	Assessing the accomplishment or non-accomplishment of an EFST is a critical aspect of execution that keeps fires focused and synchronized with the maneuver plan. FKSM 71-2-1, p. 7-8.	
EMPLOY FIRE SUPPORT (7-1-3907). (BN/TF executes fire support, using AFATDS.) FKSM 71-2-1-(EXFOR)-MTP, p. 5-70.	4.e. Adjust fire support priorities and tasks as the battle progresses. Makes changes to the appropriate AFATDS files.	Assessing the accomplishment or non-accomplishment of an EFST is a critical aspect of execution that keeps fires focused and synchronized with the maneuver plan. FKSM 71-2-1, p. 7-8.	Adjust the target values in the High Value Target List and the Target Management Matrix. This will cause the targets fired to reflect the new fire support priorities. ST 6-3, p. 5b-5.

AFATDS Battalion Task Force Task Matrix (Continued)

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
OPERATE FIRE SUPPORT SECTION (7-1-3908). (FSO and FSS develop a fire support plan, using ABCS assets). FKSM 71-2-1-(EXFOR)-MTP, pp. 5-72 - 5-73.	4.b. Build information required for transmission to company/team and below into the appropriate FBCB2: FIRES/ALERTS and OVERLAYS. FIRE SUPPORT or FIRE PLAN.	The FBCB2 fire support overlay is not projected to be able to show critical graphic control measures. A technique is to use the FBCB2 overlays to disseminate information down and pass all of the bottom-up refinements through AFATDS. Once the refinements are reviewed, approved, and entered into AFATDS, the FSO can create an updated overlay to disseminate back down. The FSE needs time to update both systems. FKSM 71-2-1, pp. 7-14 - 7-15.	
OPERATE FIRE SUPPORT SECTION (7-1-3908). (FSO and FSS develop a fire support plan, using ABCS assets). FKSM 71-2-1-(EXFOR)-MTP, pp. 5-72 - 5-73.	4.c. Ensure the fire support plan follows and accomplishes the commander's concept. Priorities of fire, target priorities, and priority targets support the commander's concept and main effort. They change to align to different phases or contingencies.	The concept of fires is the logical execution sequence of the essential fire support tasks, that, when integrated with the scheme of maneuver, will accomplish the mission and achieve the commander's intent. p. 7-10. Top-down fire planning gives the BN/TF CDR a fire support plan that focuses the fire support effort where he intends to fight the battle. FKSM 71-2-1, p. 7-12.	

AFATDS Battalion Task Force Task Matrix (Continued)

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
OPERATE FIRE SUPPORT SECTION (7-1-3908). (FSO and FSS develop a fire support plan, using ABCS assets). FKSM 71-2-1-(EXFOR)-MTP, pp. 5-72 - 5-73.	4.d. Ensure the fire support plan includes: 1). Concept for the use of fire support; 2) a target list/overlay; 3) Priorities of fire for FA and mortars; 4) allocation or location of priority targets/FPF if allocated to the battalion.	The combined arms rehearsal is required to synchronize all the BOSs before combat operations. Key fire support points that should be highlighted during rehearsal include synchronization with the maneuver plan, target execution responsibilities, and fire support coordination measures. FM 6-71, p. 3-10.	AFATDS rehearsals validate the Target Management Matrix, High Value Target List, Mission Values, Mission Prioritization, Mission Routing, firing Unit Data, FA & Mortar Attack Methods, System Preferences, FA & Mortar Restrictions, Geometries & FSCMs, Intervention Points, Accurate Fire Plan dissemination and Accurate/Capable Technical Solutions. ST 6-3, p. 5-37.
OPERATE FIRE SUPPORT SECTION (7-1-3908). (FSO and FSS develop a fire support plan, using ABCS assets). FKSM 71-2-1-(EXFOR)-MTP, pp. 5-72 - 5-73.	4.e. Synchronize fire support plan to support the scheme of maneuver. Provide for movement and use of fires that support combat units' maneuver.	The combination of the EFSTs and Concept of Fires creates the Scheme of Fires. p. 7-11.	Perform a Level III rehearsal, which can be conducted in conjunction with a maneuver dress rehearsal. ST 6-3, p. 5-37.
OPERATE FIRE SUPPORT SECTION (7-1-3908). (FSO and FSS develop a fire support plan, using ABCS assets). FKSM 71-2-1-(EXFOR)-MTP, pp. 5-72 - 5-73.	4.f. Ensure the fire support plan is adequate and contains the following: 1) Targets planned on and suspected enemy location; mounted approaches at choke points; dismounted approaches where acquisition is likely; potential enemy overwatch/support-by-fire positions; easily recognizable terrain features to slow rapid adjustment onto the enemy.	The combined arms rehearsal is required to synchronize all the BOSs before combat operations. Key fire support points that should be highlighted during rehearsal include synchronization with the maneuver plan, target execution responsibilities, and fire support coordination measures. FM 6-71, p. 3-10.	To create a target on the Target List, select Options/New to open the Basic Target Information window or select Options/Add From Map. Using the Basic Target Information Window, plan your targets. As you plan a target, they appear as planning targets (broken lines) in the planning situation screen. Once you are finished planning your targets, select "OK" to exit the window. ST 6-3, p. 5-33.

AFATDS Battalion Task Force Task Matrix (Continued)

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
OPERATE FIRE SUPPORT SECTION (7-1-3908). (FSO and FSS develop a fire support plan, using ABCS assets). FKSM 71-2-1-(EXFOR)-MTP, pp. 5-72 - 5-73.	4.f. 2) Smoke planned to obscure enemy observation, screen friendly movement, support breaching operations, and assist disengagements; 3) Targets planned to support combat and reconnaissance patrols.	Smoke or natural obscuration is imperative when making an assault breach, unless enemy defenders are totally destroyed or are being completely suppressed by the support forces. Artillery and mortar smoke is planned on locations between the enemy and the obstacle. The support force commander is normally responsible for calling for, adjusting, and shifting indirect fires and obscurants. FKSM 71-2-1, p. 4-46.	
OPERATE FIRE SUPPORT SECTION (7-1-3908). (FSO and FSS develop a fire support plan, using ABCS assets). FKSM 71-2-1-(EXFOR)-MTP, pp. 5-72 - 5-73.	4.f. 7) Control measures established to preclude engagement of friendly forces (RFL, no-fire areas, boundaries) and to facilitate engagement of enemy forces; 8) Targets, priorities, and coordination instructions established for mortars; 10) Assigned responsibilities and instructions for execution of the fire plan (may be in synchronization or fire support execution matrix.	The combined arms rehearsal is required to synchronize all the BOSs before combat operations. Key fire support points that should be highlighted during rehearsal include synchronization with the maneuver plan, target execution responsibilities, and fire support coordination measures. FM 6-71, p. 3-10.	Perform a Level III rehearsal, which can be conducted in conjunction with a maneuver dress rehearsal. ST 6-3, p. 5-37.

AFATDS Battalion Task Force Task Matrix (Continued)

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
OPERATE FIRE SUPPORT SECTION (7-1-3908). (FSO and FSS coordinate the fire support plan before the battle, using ABCS, specifically MCS, ASAS and AFATDS, to maximize information management and minimize electronic signature. NOTE: Fire support information required for transmission to CO/TM and below must be built into the appropriate FBCB2 files) FKSM 71-2-1-(EXFOR)-MTP, pg. 5-72 - 5-73.	5.e. Consolidate targets from company team commanders/FSOs and other elements into the target list and eliminate duplications.	Once a COA is selected, it can be developed into a fire support plan, in the planning situation, and disseminated to subordinate OPFACs (top-down fire planning process). Subordinate OPFACs can then refine the plan and submit refinement information (bottom-up refinement). After the refinement is received, the BN/TF FSO consolidates the lists and eliminates duplication. ST 6-3, p. 5-1.	The operator calls up the On-call target list. He then opens the planned target list that was transmitted. tHis opens that target list, along with a black left arrow, that allows him to selectively choose targets to import into his On-Call List. He simply highlights the targets and hit the left arrow to put them into his Current On-Call List. This procedure is especially useful during the refinement phase of planning. ST 6-3, p. 5-28.
OPERATE FIRE SUPPORT SECTION (7-1-3908). (FSO and FSS coordinate the fire support plan before the battle, using ABCS, specifically MCS, ASAS and AFATDS, to maximize information management and minimize electronic signature. NOTE: Fire support information required for transmission to CO/TM and below must be built into the appropriate FBCB2 files) FKSM 71-2-1-(EXFOR)-MTP, pg. 5-72 - 5-73.	5.f. Coordinate with company FIST team chief to ensure understanding of company plans and BN/TR fire plans. NOTE: CO FIST team chief should have all applicable FBCB2 overlays in OVERLAYS: FIRE SUPPORT.	The combined arms rehearsal is required to synchronize all the BOSs before combat operations. Key fire support points that should be highlighted during rehearsal include synchronization with the maneuver plan, target execution responsibilities, and fire support coordination measures. FM 6-71, p. 3-10.	Conduct any of the three levels of rehearsal or use voice to ask about the overlays and fire plans. ST 6-3, pgs. 5-37, 5-38.

We developed the AFATDS scenario based on the tasks and TTP in the preceding Task Matrix. Following scenario development, we described displays to support the assessment of BLUFOR's employment of AFATDS for mission planning and execution using the C4I Performance Assessment Matrix shown above. Next, we illustrated displays of each trainer alert and AAR aid. As we completed a set of displays, we updated the C4I Performance Assessment Matrix to describe the functionality that produced the displays and presentation timing. We developed separate illustrations with accompanying narrations to guide the reader through the scenario.

CONVENTIONS: As you proceed through the AFATDS scenario, you will view proposed displays to assist the training analyst in monitoring digital communications and assessing BLUFOR performance. Below each display is a narrative which addresses the training analyst's interactions with the TAF workstation as he observes BLUFOR digital actions and inactions during the exercise. We will use the conventions below in our narration of various display features and user interface functions as we discuss the trainers interaction with the displays.

BOLD text- represents analyst selection of an item (mouse click)

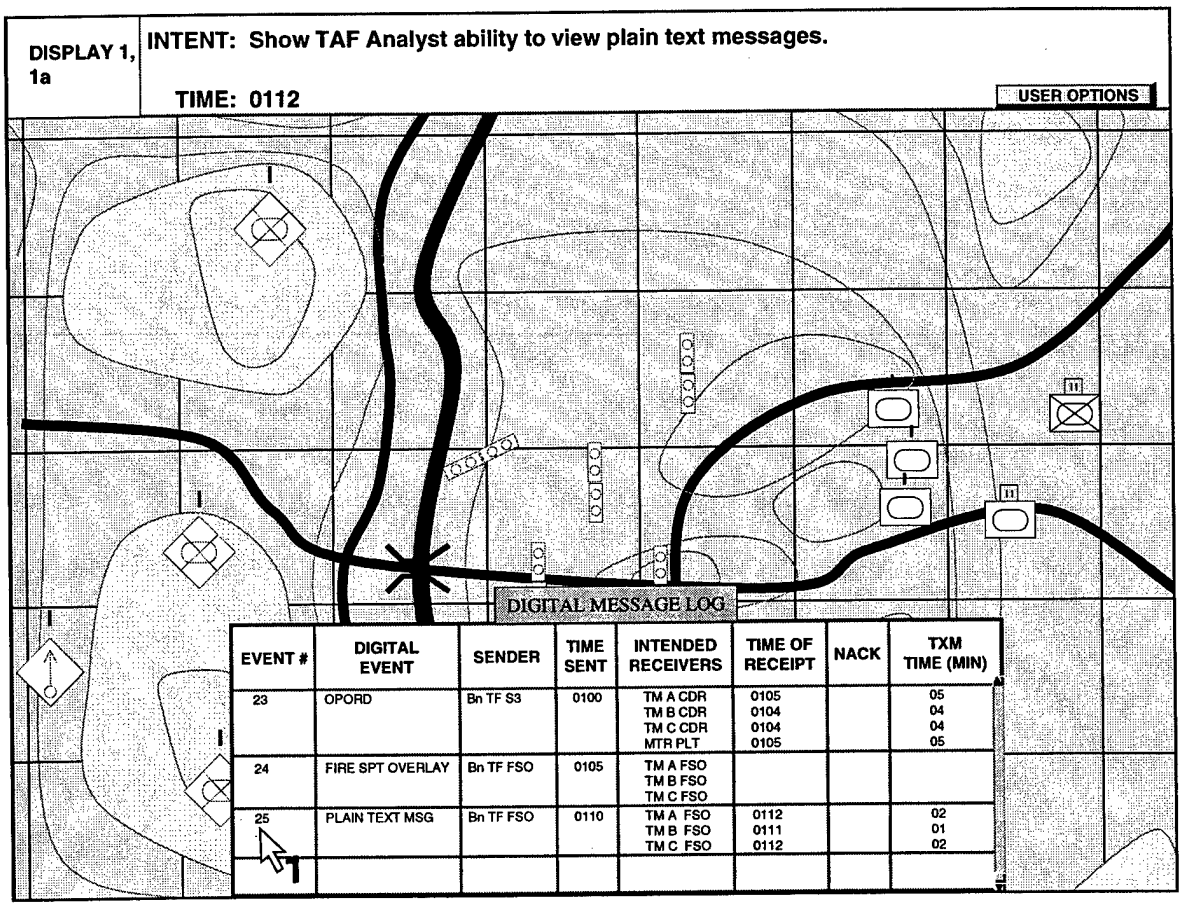
Italics - represents analyst-entered data

"Quotes" - represents names of dialog boxes

C4I PERFORMANCE ASSESSMENT MATRIX

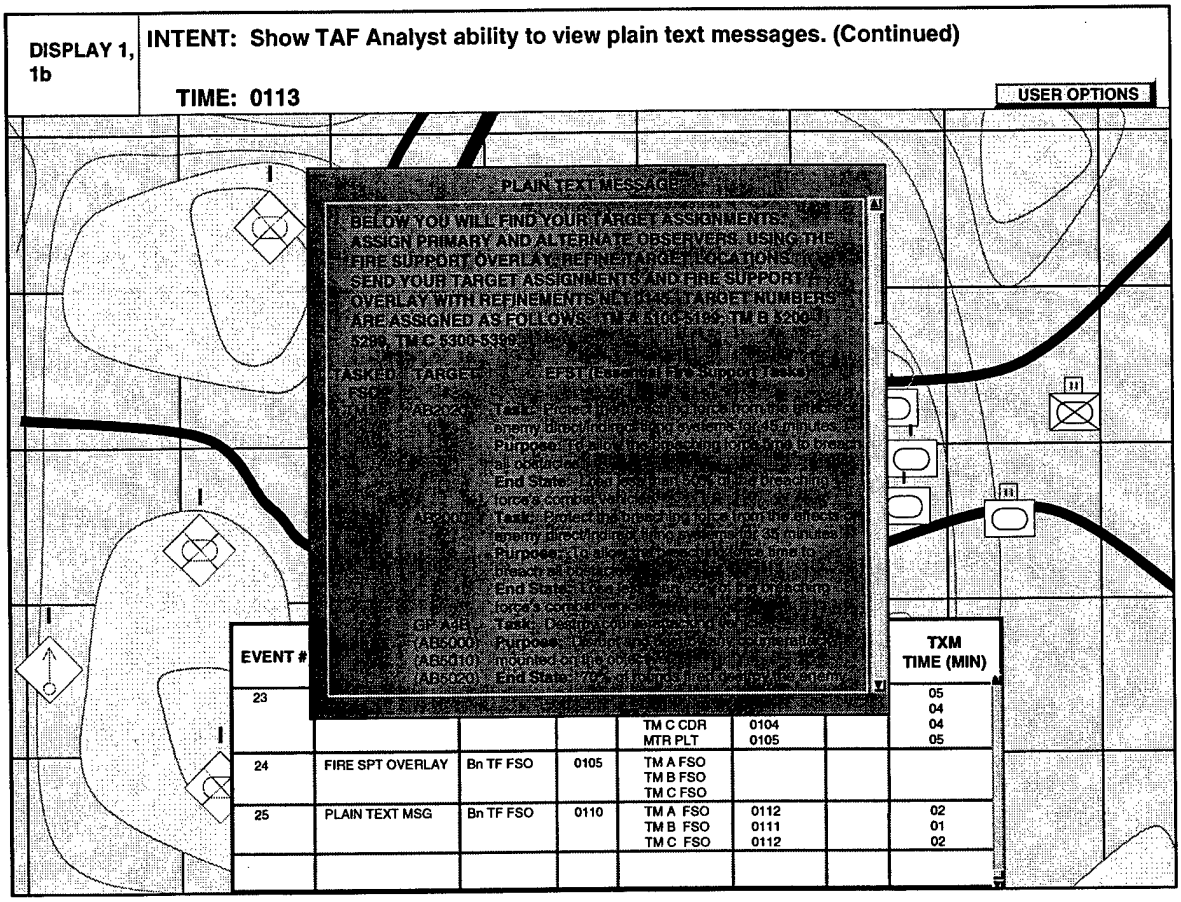
INTENT: Show TAF Analyst ability to view plain text messages.

AFATDS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Friendly and enemy unit placement.	**DISPLAY 1 :** Perceived truth of the BCT area of operation.		**X**		**DISPLAY 1a :** *Digital Message Log.* Shows each filtered message type and unit selected by user, as it is transmitted, and keeps a running log of the messages until the user changes the message filter selection. TRIGGER. When the system senses a filtered message, it enters the message information into the "Digital Message Log." **DISPLAY 1b :** *Message Content.* Provides user with display of the plain text message. TRIGGER. User selects **EVENT #25** to cause the message to appear.		**X**	



SCENARIO. The Brigade Combat Team (BCT) gave Bn TF 3-5 the Support Force mission. The BCT commander placed all BCT organic artillery and the mortar platoons of each Bn TF under Bn TF 3-5 control for the breaching phase of the operation. NOTE: Our focus in this scenario is on Bn TF 3-5.

TAF ANALYST/WORKSTATION ACTIONS. The TAF Analyst notes that the Bn TF FSO sent his Fire Support Overlay and a free text message. The Analyst knows this is the Bn TF top-down fire planning sequence. He sees that the Bn TF FSO sent the overlay but the receiving units have not received it. He also notices the plain text message has been sent and received. He decides to see what the Bn TF FSO's top-down guidance contains. The Analyst clicks **EVENT #25**. The Analyst is viewing the display in the "Perceived Truth" mode, since the Bn TF is still planning.



TAF ANALYST/WORKSTATION ACTIONS. After clicking **EVENT #25**, the plain text message appears. As the Analyst suspected, it is the guidance for the Co Tm FSOs to use for their planning. He scrolls through the entire message, which reveals the guidance and assignments the Bn TF FSO is giving to each Co Tm FSO.

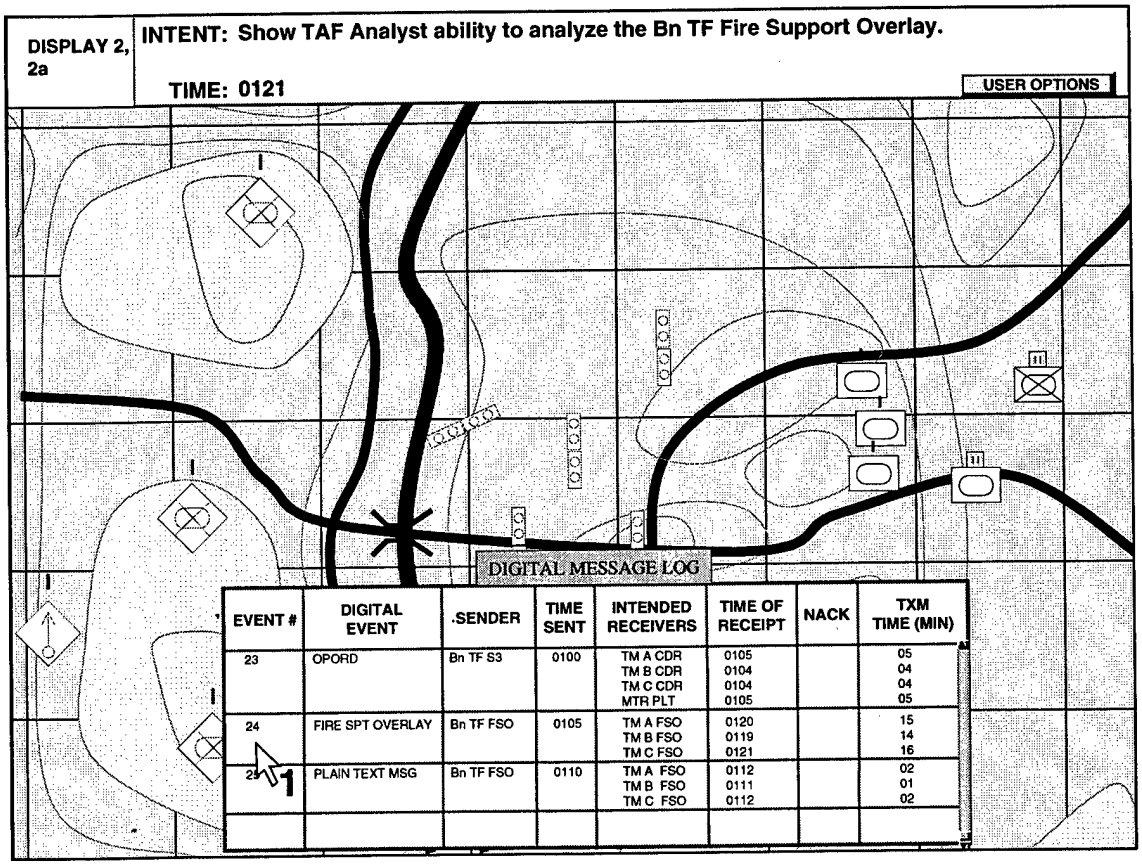
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show TAF Analyst ability to analyze the BN/TF Fire Support Overlay.

AFATDS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF Fire Support Overlay. TRIGGER. User clicks on **EVENT #24.**	**DISPLAY 2 :** Perceived truth of the BCT area of operation.		X		**DISPLAY 2a :** *Digital Message Log.* Shows each filtered message type and unit selected by user, as it is transmitted, and keeps a running log of the messages until the user changes the message filter selection. TRIGGER. When the system senses a filtered message, it enters the message information into the "Digital Message Log." **DISPLAY 2b :** *Dialog Box.* Provides user with option to analyze the Fire Support Overlay. TRIGGER. System "senses" the user has loaded a Fire Support Overlay.		X	

C4I PERFORMANCE ASSESSMENT MATRIX

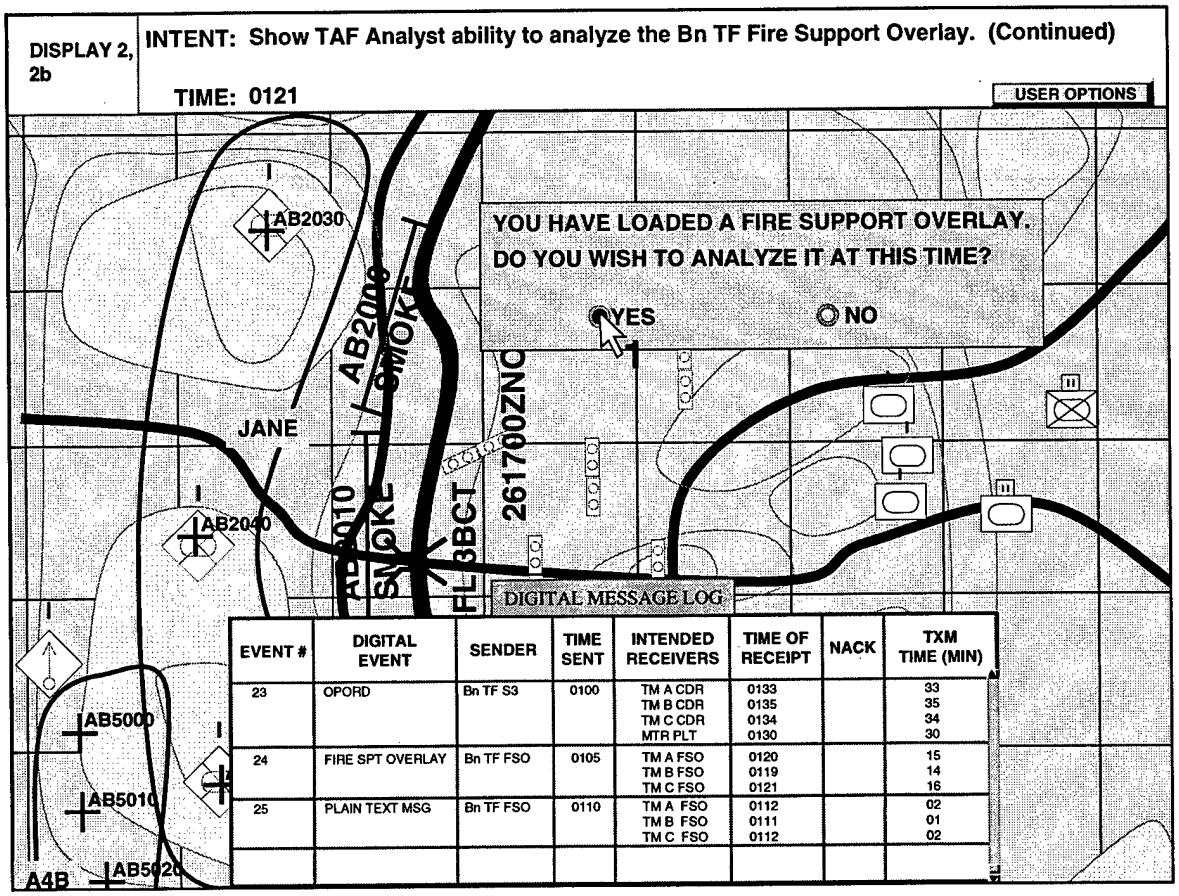
INTENT: Show TAF Analyst ability to analyze the BN/TF Fire Support Overlay (CONTINUED).								
AFATDS DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
BN/TF Fire Support Overlay.	**DISPLAY 2 :** Perceived truth of the BCT area of operation.		**X**	**X**	**DISPLAY 2c :** *Target Doctrine Rating Dialog Box.* Allows the user to use a Target Doctrine Criteria checklist to evaluate the Fire Support Overlay TRIGGER. User selects the **YES** radio button in the previous dialog box. **DISPLAY 2d :** *Multicolored Symbols.* User clicks on area of map where target doctrine criteria is not met. TRIGGER. User clicks a **NO GO** radio button for target doctrine criteria.		**X**	**X**



SCENARIO. All of the Co Tm FSOs have received the Fire Support Overlay and are beginning to perform bottom-up fire planning.

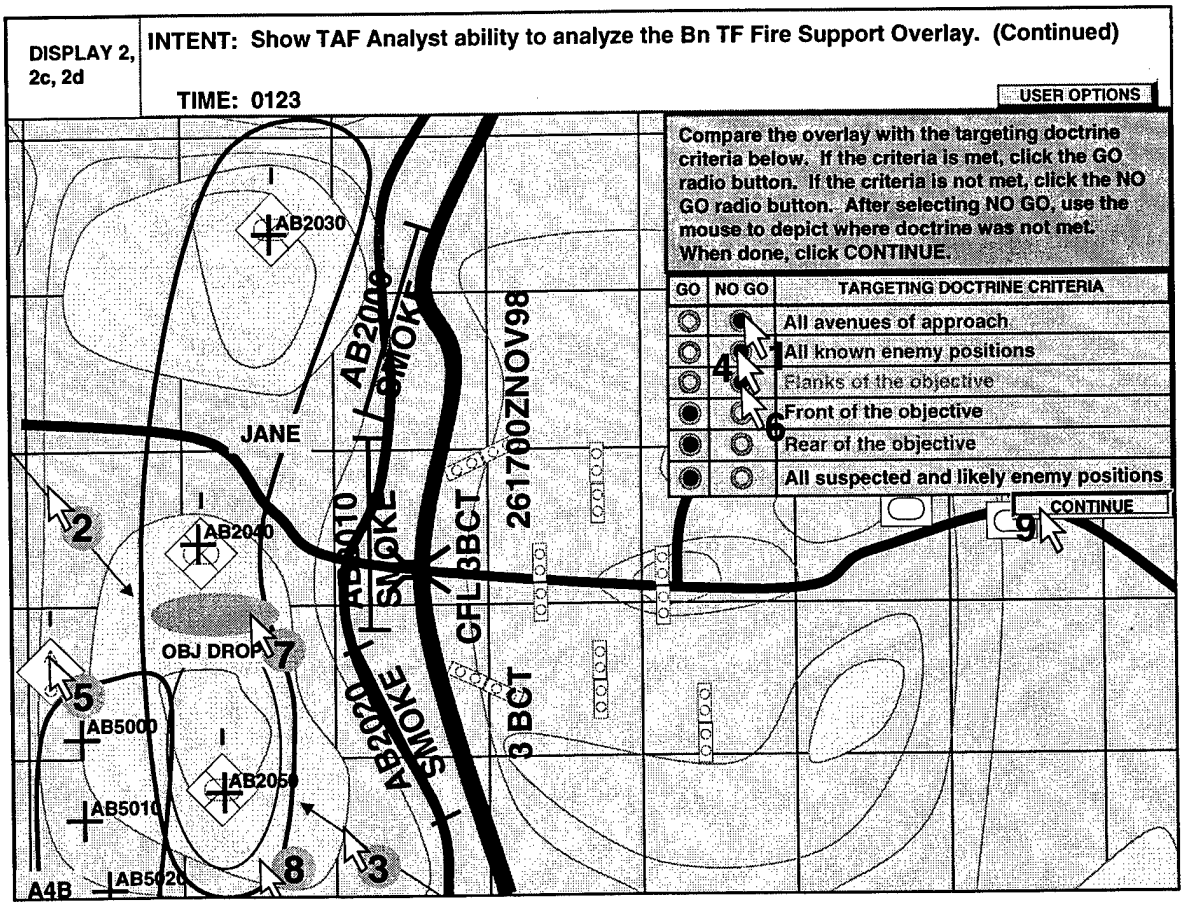
TAF ANALYST/WORKSTATION ACTIONS. The Analyst notes that all the intended recipients of the Fire Support Overlay have

received it. He decides to view the overlay and clicks on **EVENT #24**.



EVENT #	DIGITAL EVENT	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	TXM TIME (MIN)
23	OPORD	Bn TF S3	0100	TM A CDR TM B CDR TM C CDR MTR PLT	0133 0135 0134 0130		33 35 34 30
24	FIRE SPT OVERLAY	Bn TF FSO	0105	TM A FSO TM B FSO TM C FSO	0120 0119 0121		15 14 16
25	PLAIN TEXT MSG	Bn TF FSO	0110	TM A FSO TM B FSO TM C FSO	0112 0111 0112		02 01 02

TAF ANALYST/WORKSTATION ACTIONS. Once the Analyst clicks on **EVENT #24**, the Bn TF Fire Support Overlay appears. Upon displaying the overlay, the system "senses" a fire support overlay has been displayed and asks the Analyst if he wishes to analyze the overlay. The Analyst decides to do so and clicks the **YES** radio button.



TAF ANALYST/WORKSTATION ACTIONS. After the TAF Analyst clicks the **YES** radio button, a checklist of target doctrine criteria appears. This checklist prompts the Analyst to thoroughly check the overlay for specific things. He looks for targets on avenues of approach around OBJ DROP. As he looks, he notes there is an avenue of approach from the northwest going southeast. Since he sees an avenue of approach with no targets, he clicks the NO GO radio button. Next, he clicks in the area and a blue arrow appears. (NOTE: He must click the NO GO radio button first to enable the system to create the arrow when he clicks the map area. He must use this sequence each time to cause the system to create the proper symbol for the violated doctrinal criteria.) He uses his mouse to orient the arrow to point in the proper direction. The Analyst also notes an avenue of approach from the southeast going northwest and clicks in that area. Again, he orients the arrow that appears. The Analyst follows the same sequence for each of the criteria.

After he completes his analysis, he clicks on **CONTINUE**, causing the system to create an AAR aid.

DISCUSSION POINTS FOR AAR DISPLAY 2

WHAT HAPPENED:(Trainer Entry)

The fire support overlay indicates coverage of enemy avenues of approach, known enemy positions, and flanks of the objective are not adequate.

FACILITATING QUESTIONS (WHY IT HAPPENED)(System Entry)

1. What does doctrine say about targeting for the offense?

2. What was your commander's guidance concerning targets?

3. Was top-down and bottom-up fire planning conducted?

HOW TO IMPROVE:(System Entry)

Targets that facilitate the accomplishment of critical fire tasks, and that support the scheme of maneuver can be nominated during the bottom-up refinement early in the planning process. After receiving the CO/TM offensive fire plan, the platoon leader checks it to ensure that targets are planned on all known or suspected enemy positions in front of, on, behind, and to the flanks of the objective or BP. Likely areas for these targets include observed choke points, avenues of approach, obstacles, and likely support by fire positions.

Reference: FKSM 17-15-1 (EXFOR)

TAF ANALYST/WORKSTATION ACTIONS. When the system detects a problem with the Fire Support Overlay, it begins a search of its database to find "Facilitating Questions" and "How To Improve" statements, along with references pertaining to construction of a Fire Support Overlay and targeting. The system places the information in the AAR bin until the Analyst has time to place his comments on the aid and modify it to reflect the situation.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show TAF Analyst ability to analyze top-down fire planning and bottom-up target refinement.

AFATDS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF Fire Support Overlay. A CO/TM Fire Support Overlay. TRIGGER. User clicks on **EVENT #26**	**DISPLAY 3 :** Perceived truth of the BCT area of operation.		**X**		**DISPLAY 3a :** *Digital Message Log.* Shows each filtered message type and unit selected by user, as it is transmitted, and keeps a running log of the messages until the user changes the message filter selection. TRIGGER. When the system senses a filtered message, it enters the message information into the "Digital Message Log." **DISPLAY 3b :** *Message Content.* Provides user with display of the plain text message. TRIGGER. User selects **EVENT #25** to cause the message to appear.		**X**	

C4I PERFORMANCE ASSESSMENT MATRIX

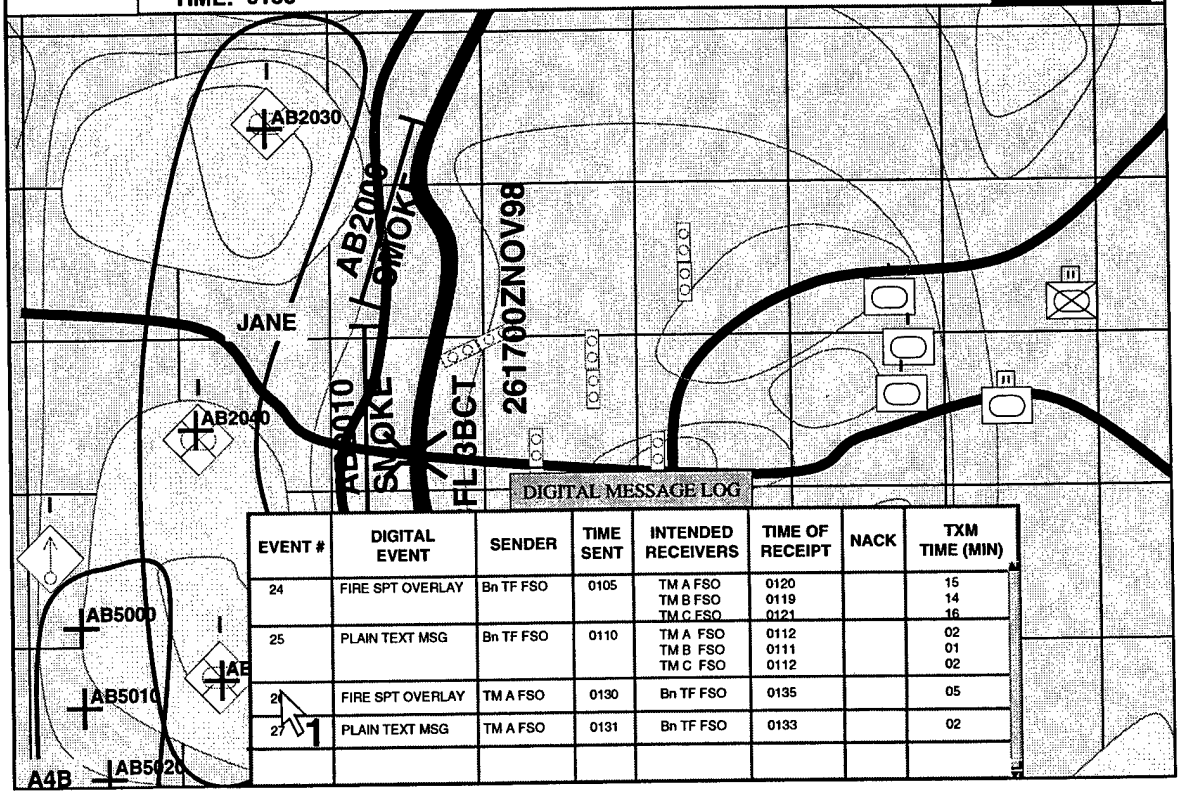
INTENT: Show TAF Analyst ability to analyze top-down fire planning and bottom-up target refinement (CONTINUED).

AFATDS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF Fire Support Overlay. A CO/TM Fire Support Overlay.	**DISPLAY 3 :** Perceived truth of the BCT area of operation.		X	X	**DISPLAY 3c :** *Message Content.* Provides user with display of the plain text message. TRIGGER. User selects **EVENT # 27** to cause the message to appear. **DISPLAY 3d :** *Multicolored Symbols.* User draws boxes around text where text differs between BN/TF and CO/TM messages. TRIGGER. User compares plain text messages and notes differences.		X	X

DISPLAY 3, 3a

INTENT: Show TAF Analyst ability to analyze top-down fire planning and bottom-up target refinement.

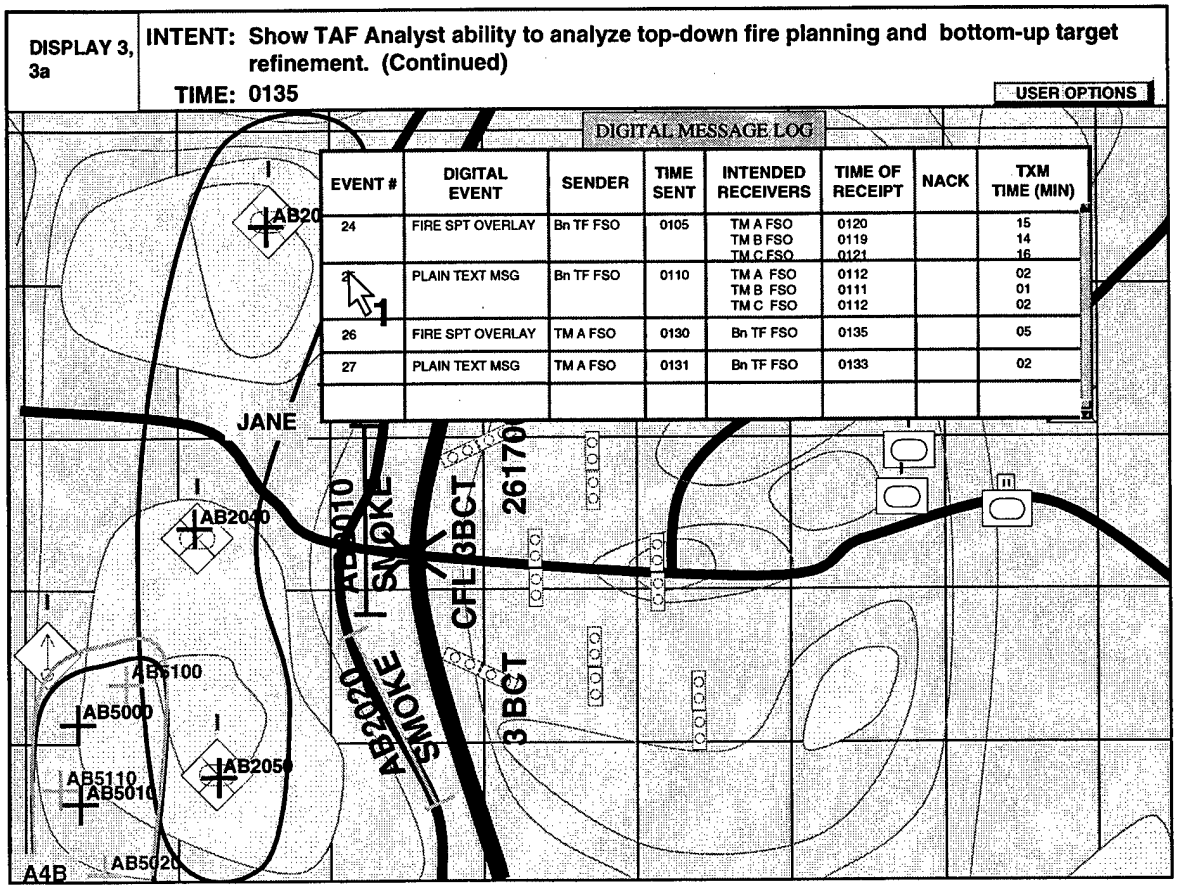
TIME: 0135



EVENT #	DIGITAL EVENT	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	TXM TIME (MIN)
24	FIRE SPT OVERLAY	Bn TF FSO	0105	TM A FSO TM B FSO TM C FSO	0120 0119 0121		15 14 16
25	PLAIN TEXT MSG	Bn TF FSO	0110	TM A FSO TM B FSO TM C FSO	0112 0111 0112		02 01 02
26	FIRE SPT OVERLAY	TM A FSO	0130	Bn TF FSO	0135		05
27	PLAIN TEXT MSG	TM A FSO	0131	Bn TF FSO	0133		02

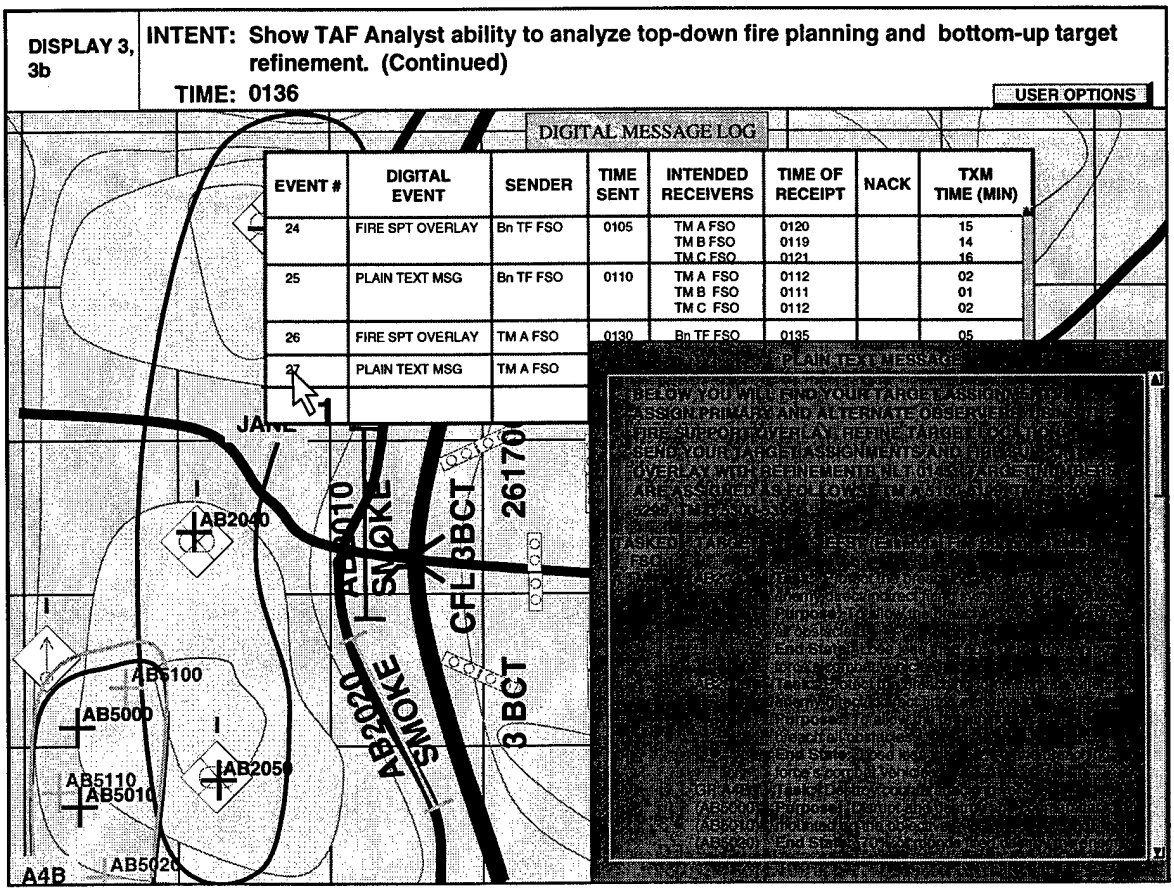
SCENARIO. TM A FSO has completed his bottom-up fire planning and has sent his results to the Bn TF FSO.

TAF ANALYST/WORKSTATION ACTIONS. While the TAF Analyst was performing his analysis on the Bn TF Fire Support Overlay, the system recorded the transmission and receipt of the TM A Fire Support Overlay and his assignment of targets to his observers. The Analyst first decides to display the TM A Fire Support Overlay over the Bn TF overlay to readily see if the targets remain the same, if the TM A FSO missed any targets, and if the target numbers make sense. From previous messages, the Analyst knows that the Bn TF has target numbers 5000-5500. He also knows TM A was assigned target numbers 5100-5199.



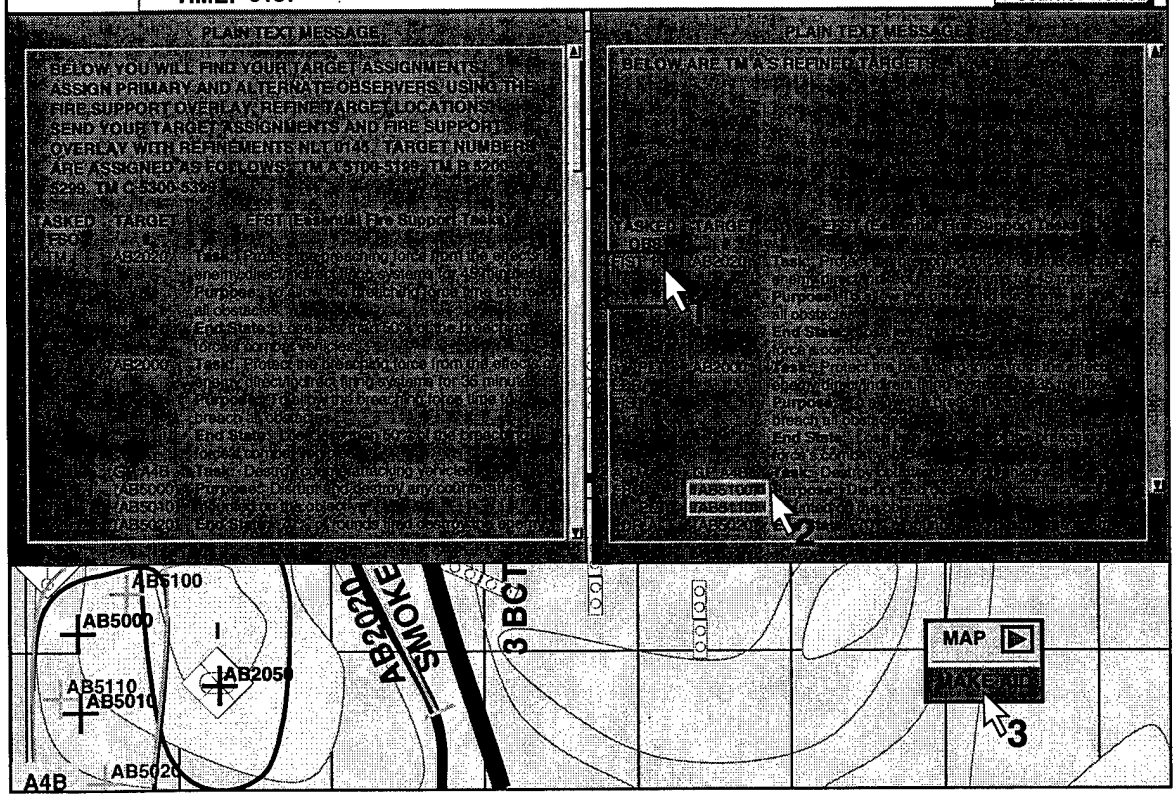
TAF ANALYST/WORKSTATION ACTIONS. The Analyst moves the "DIGITAL MESSAGE LOG" out of the way to view the TM A Fire Support Overlay. He notes the smoke missions have not been moved, since the target labels and symbols are superimposed on the Bn TF labels and symbols. Looking at Group A4B, he sees there are some TM A targets, depicted by a lighter color and a different target number. The Analyst decides AB5100 appears to be a refinement of AB5000 and AB5110 appears to be a refinement of AB5010. Since AB5020 is the same number as that of the Bn TF, the Analyst knows TM A is using the target given by Bn TF.

To be sure these are refinements and not totally new targets, and also to be sure the Bn TF FSO's intent is still achieved, the Analyst decides to compare the Bn TF FSO's target assignments with TM A's refinement. First, he will bring-up the Bn TF plain text message. To do this, he clicks **EVENT #25**.



TAF ANALYST/WORKSTATION ACTIONS. The system displays the Bn TF target assignments after the Analyst clicks **EVENT #25**. Next, he clicks **EVENT #27** to display TM A FSO's plain text message sent to Bn TF FSO.

DISPLAY 3, 3c	INTENT: Show TAF Analyst ability to analyze top-down fire planning and bottom-up target refinement. (Continued) TIME: 0137



TAF ANALYST/WORKSTATION ACTIONS. When the system displays TM A FSO's plain text message, the Analyst arranges the screen for ease of comparison. The Analyst first checks to see if the same number of targets are listed on both messages. Next, he looks at the target numbers. He notes the different target numbers in A4B, draws a box around them, and checks the EFSTs for both messages to ensure TM A's are the same as the Bn TF's. The Analyst then checks for observers and alternate observers for TM A's targets. He notes AB2020 has only a primary observer and no alternate. He draws a red box around the observer. After the Analyst is through with his comparison, he right clicks on the map, revealing a menu allowing him to either manipulate his map or create an AAR aid. He left clicks on **MAKE AID**.

DISCUSSION POINTS FOR AAR DISPLAY 3

WHAT HAPPENED:(Trainer Entry)

Assignment of targets during the breaching phase was not adequate. There was no alternate unit assigned to the smoke missions or the suppression mission for the Bn TF. Also there was no alternate observer assigned to AB2020 by TM A.

FACILITATING QUESTIONS (WHY IT HAPPENED):(System Entry)

1. What were the reasons behind the observer assignments?

2. Why were no alternate observers assigned?

3. Was a rehearsal conducted?

HOW TO IMPROVE:(System Entry)

At Bn TF level, the Bn TF FSO prepares the Fire Support Execution Matrix. He coordinates with the Co Tm FSOs and mortar platoon leader. With the S2, he positions and controls observation assets. This coordination is needed to ensure the FS Plan assigns observers and backup observers for Bn TF targets and brigade targets assigned to the Bn TF.

When planning fires, it is essential to address the following aspects of each target: Purpose, location, trigger, shooter/backup shooter, positive clearance of fires, communications structure, rehearsal, and delivery assets. If each of these are not identified, planned, resourced and rehearsed, the successful execution of that target is at risk.

While developing the Fire Support Plan, place observers on your map to see targets. For the Offense, this will be hard to determine and must be entered as next unit locations.

If it is important enough to target, it is important enough to have eyes on target. At the Co Tm level, the commander is responsible for ensuring assigned targets are observed, have alternate observers, have a trigger, and are rehearsed.

Reference: FKSM 71-2-1 (EXFOR)-MTP, ST 6-3, FM 6-71, FM 6-20-10

TAF ANALYST/WORKSTATION ACTIONS. When the system displays the Fire Support Execution Matrix, the system begins a search of its database to find "Facilitating Questions" and "How To Improve" statements, along with references pertaining to the Fire Support Execution Matrix. The system places this information into an AAR bin for the Analyst to review, allowing him to modify the aid at his convenience.

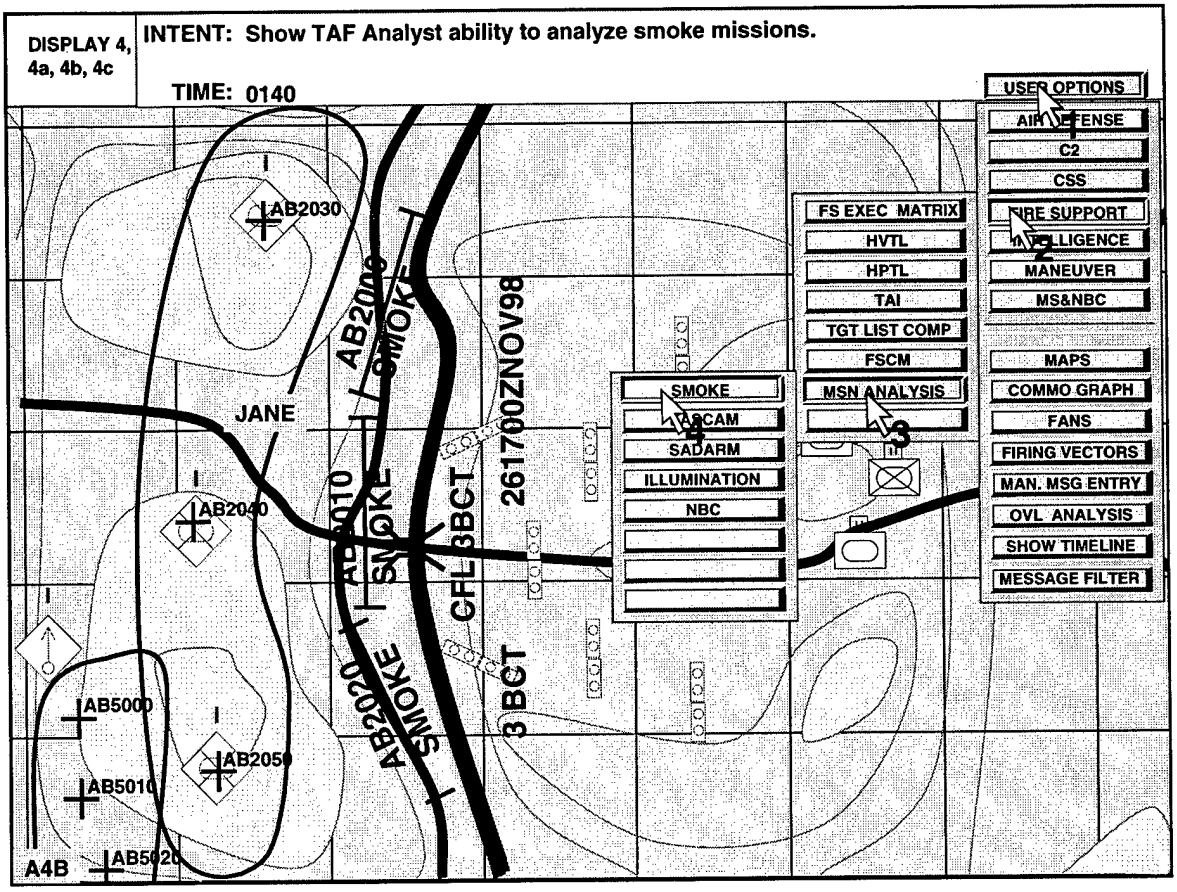
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show TAF Analyst ability to analyze smoke missions.

AFATDS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Fire Support Overlay.	**DISPLAY 4 :** Perceived truth of the BCT area of operation.		**X**		**DISPLAY 4a :** *Pull-Down Menu.* Provides user capability to select specific BOSs and their specific requirements or general areas, such as commo graphs, firing vectors, etc. TRIGGER. User selects **USER OPTIONS** to reveal his options. **DISPLAY 4b :** *Fire Support Selections.* Shows each of the possible selections available under the BOS Fire Support. TRIGGER. When the user selects **FIRE SUPPORT** on the "USER OPTIONS" pull-down, the dialog box appears. **DISPLAY 4c :** *Mission Selections.* Shows each of the possible selections available under mission analysis. TRIGGER. User selects **MSN ANALYSIS.**		**X**	

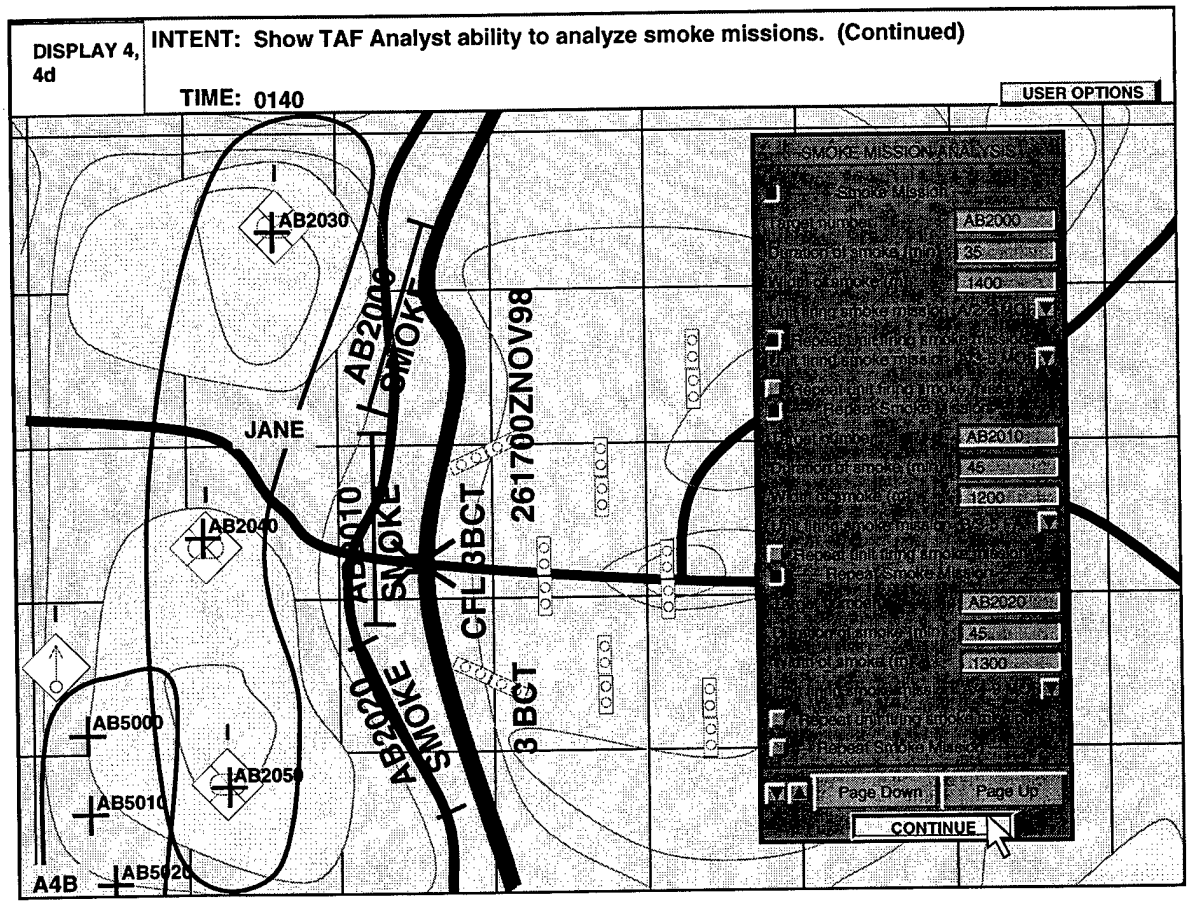
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show TAF Analyst ability to analyzesmoke missions (CONTINUED).								
AFATDS DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
Fire Support Overlay.	**DISPLAY 4 :** Perceived truth of the BCT area of operation.		**X**	**X**	**DISPLAY 4d :** *Smoke Mission Analysis Dialog Box.* Requires user to input *Target number, Duration of smoke, Width of smoke,* and *Unit firing smoke mission.* TRIGGER. User selects **SMOKE** from the "MISSION SELECTION" dialog box. **OPTIONS** to reveal his options. **DISPLAY 4e :** *Results Dialog Box.* System displays results of its analysis of the smoke missions. TRIGGER. The user completes the "Smoke Mission Analysis" dialog box and selects **CONTINUE**		**X**	**X**

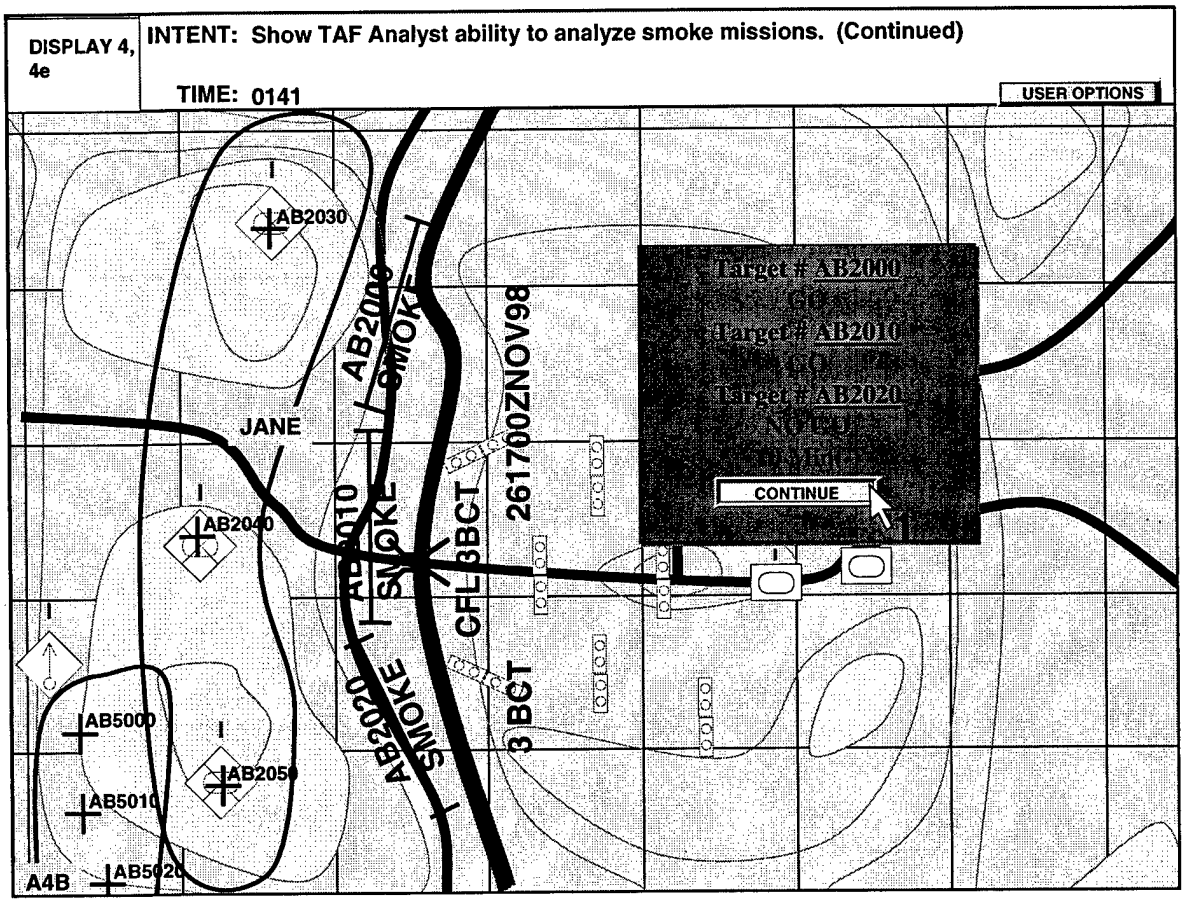


TAF ANALYST/WORKSTATION ACTIONS. To continue the TAF Analyst's investigation of the fire support aspects of the plan, he decides to check the viability of the planned smoke mission to facilitate the breach. He has already read the fire support annex and knows how long the smoke is to last and which units

will fire it. He knows from the top-down plain text message which units will fire which smoke targets. To check the smoke mission planning adequacy, the Analyst clicks **USER OPTIONS**, **FIRE SUPPORT**, **MSN ANALYSIS** and **SMOKE**.



TAF ANALYST/WORKSTATION ACTIONS. Once the Analyst clicks on SMOKE, a dialog box appears, requiring him to complete information on each smoke target. He clicks on the gray box next to" ---- Smoke Missions ---" to reveal spaces for "Target number," "Duration of smoke (min)," "Width of smoke (m)," and "Unit firing smoke mission." In each of the blanks, he enters the appropriate data. To select a unit, the Analyst clicks on the down arrow, revealing a drop-down list of firing units. If there is more than one firing unit assigned a target, the Analyst clicks the gray button next to "Repeat unit firing smoke mission," allowing him to choose an additional firing unit. He completes this iterative process until all smoke mission data is entered. After completing the dialog box, he clicks **CONTINUE**.



TAF ANALYST/WORKSTATION ACTIONS. After clicking **CONTINUE**, the system checks the number of smoke rounds available for each unit, the amount of time each must supply smoke, and the width of the target. The system evaluates each smoke target and returns either a GO or a NO GO. If the system returns a NO GO, the firing unit does not have enough ammunition to sustain the smoke for the required time. The system also indicates the shortfall between what the unit can produce and the required time for the smoke. The Analyst notes the problem and realizes he should keep an eye on the southern part of the area of operation during the breach. He clicks **CONTINUE**.

DISCUSSION POINTS FOR AAR DISPLAY 4

WHAT HAPPENED:(Trainer Entry)

The planning for the smoke mission on Target on AB2020 was 10 minutes short of the required duration.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. During the rehearsal, what problems surfaced regarding smoke ammunition?

2. What actions were taken to verify that the required amount of smoke was on hand prior to LD time?

HOW TO IMPROVE: (System Entry)

Smoke or natural obscuration is imperative when making an assault breach, unless enemy defenders are totally destroyed or are being completely suppressed by the support forces. Specialized engineer equipment, dismounted engineers, and infantry are extremely vulnerable to enemy direct and indirect fires, which will be focused on the obstacle.

AFATDS will conduct a field artillery estimate of the capabilities and munitions requirements based on fire plan data. The estimate includes:

- **a listing of shell/fuze quantities required, based on the number and type of acquirable and attackable targets and on attack guidance.**
- **calculating the number of rounds required to achieve specific desired effects (expressed in percent) on a target. It can also compute the effects on a target, based on the number of rounds you want to fire on it.**

Reference: FKSM 71-2-1 (EXFOR), ST 6-3

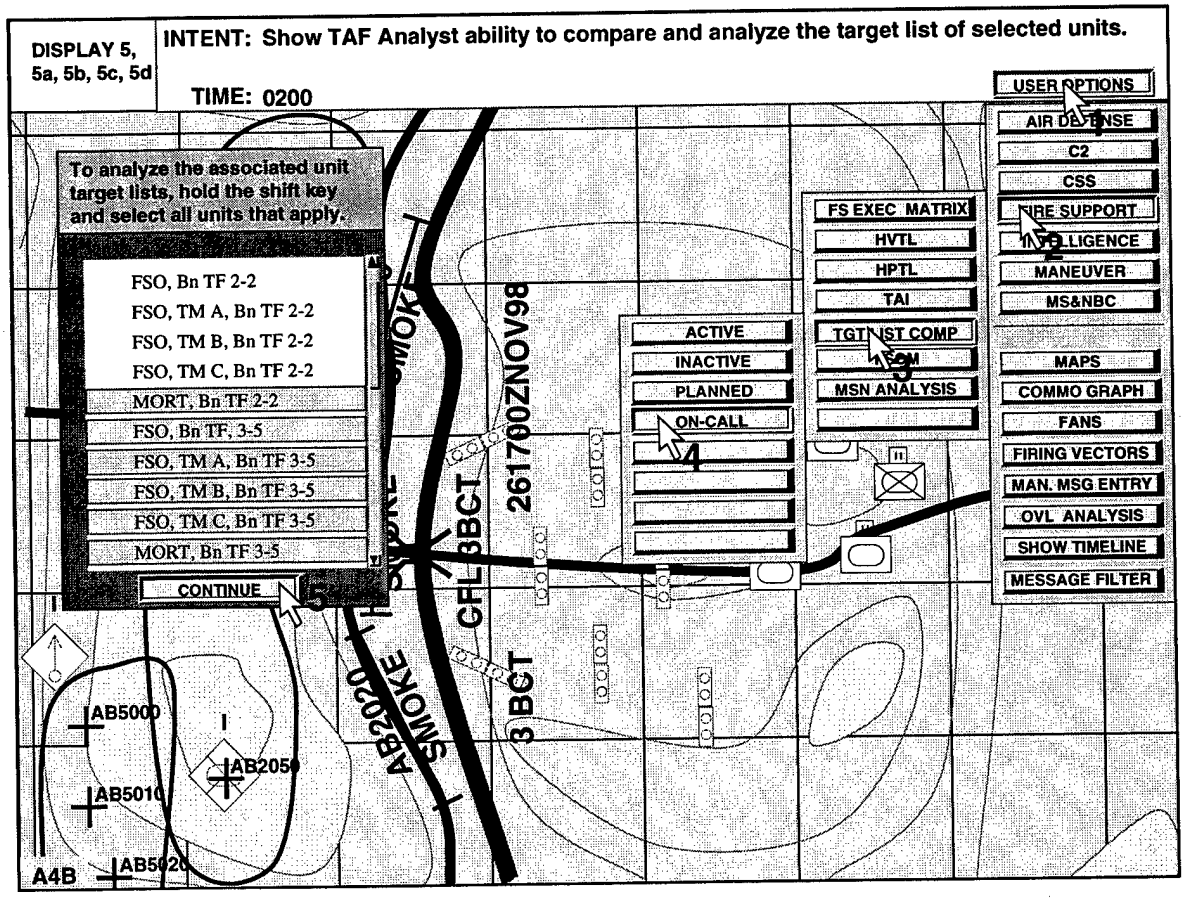
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show TAF Analyst ability to compare and analyze the target lists of selected units.

AFATDS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Fire Support Overlay.	**DISPLAY 5 :** Ground truth of the BCT area of operation under Fire Support Overlay. Zoomed in map and CO/TM resolution on BN/TF 3-5. TRIGGER. Selection of + magnifying glass and selection of CO/TM in previous display.		**X**		**DISPLAY 5a :** *Pull-Down Menu.* Provides user capability to select specific BOSs and their specific requirements or general areas such as commo graphs, firing vectors, etc. TRIGGER. User selects **USER OPTIONS** to reveal his options. **DISPLAY 5b :** *Fire Support Selections.* Shows each of the possible selections available under the BOS Fire Support. TRIGGER. When the user selects **FIRE SUPPORT** on the "USER OPTIONS" pull-down, the dialog box appears. **DISPLAY 5c :** *Target List Selections.* Shows each of the possible selections available. TRIGGER. User selects **TGT LIST COMP** from the "Fire Support Selections" pull-down.		**X**	

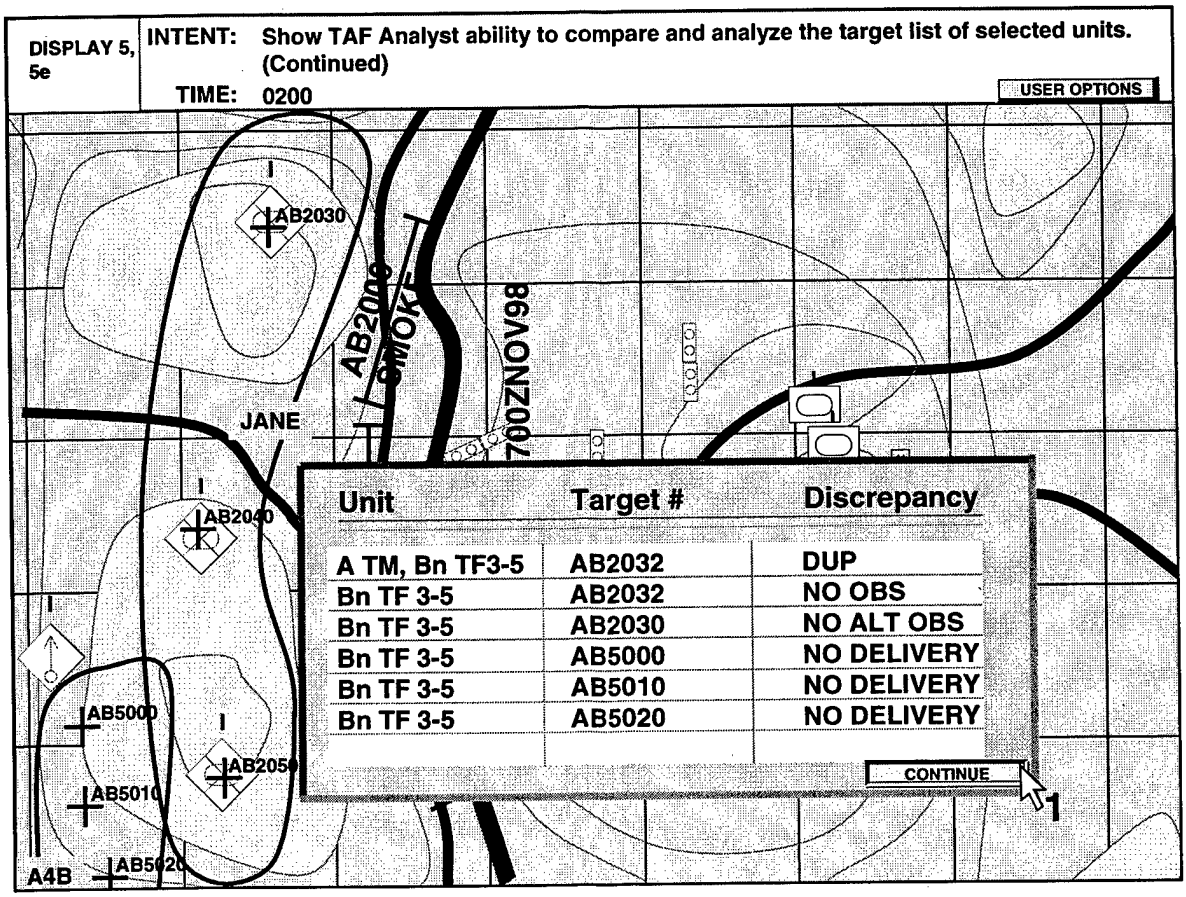
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show TAF Analyst ability to compare and analyze the target lists of selected units (CONTINUED).								
AFATDS DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
Fire Support Overlay.	**DISPLAY 5 :** Perceived truth of the BCT area of operation.		X		**DISPLAY 5d :** *Target List Analysis Dialog Box.* Allows user to select units for the system to analyze their target lists. TRIGGER. User selects **ON-CALL** from the "Type-Target List" pull-down. **DISPLAY 5e :** *Target List Analysis.* Shows the result of the system's analysis of the target lists. TRIGGER. User selects the units that are to have their target lists analyzed, then selects **CONTINUE**		X	X



TAF ANALYST/WORKSTATION ACTIONS. From the Bn TF 3-5 OPORD and its associated Fire Support Annex, the Analyst notes who has responsibility for fires and observation during the entire operation. He decides to check the target lists to see if there are any discrepancies, such as DUP (meaning the same target number was found in other lists with a different grid location);

NO OBS (meaning no observer was assigned the target); NO ALT OBS (meaning an alternate observer was not assigned); NO DELIVERY (meaning no delivery assets were tasked with firing the target). Any discrepancies found will assist him in focusing on cause and effect relationships of the battle. It will also allow him to alert the OCs in the respective units to watch for problems in these areas and at this time. The TAF Analyst selects **USER OPTIONS**, **FIRE SUPPORT**, **TARGET LIST COMP**, and **ON-CALL**. After selecting **ON-CALL**, the system displays a dialog box, requiring the Analyst to select the units who's target lists he wants to compare. He holds the shift key and selects the units, scrolling to find all of them. Once he has selected all of the units, he clicks **CONTINUE**.



TAF ANALYST/WORKSTATION ACTIONS. After selecting **CONTINUE**, the system evaluates each list, comparing it to the Bn TF list. Once complete, the system displays its findings. The system names the unit with the anomalous entry, the target number, and what was wrong with the entry. The Analyst takes this information and passes it to the respective OCs. Once he has finished with the information, the Analyst selects **CONTINUE**.

DISCUSSION POINTS FOR AAR DISPLAY 5

WHAT HAPPENED(Trainer Entry)

Several targets were not covered properly.

FACILITATING QUESTIONS (WHY IT HAPPENED(System Entry)

1. Was AFATDS used to deconflict, delete duplicates, and refine the target lists?

2. Was a digital rehearsal performed to ensure adequate coordination?

HOW TO IMPROVE(System Entry)

AFATDS provides means to deconflict and disseminate refinement data on target lists. It also allows target lists to be disseminated and implemented in the current situation so the fire support technical rehearsal may take place.

AFATDS has a function to allow the user to resolve duplication of targets. The digital rehearsal can be used to discover problems with the plan, including lack of shooters, observers, alternate observers, etc.

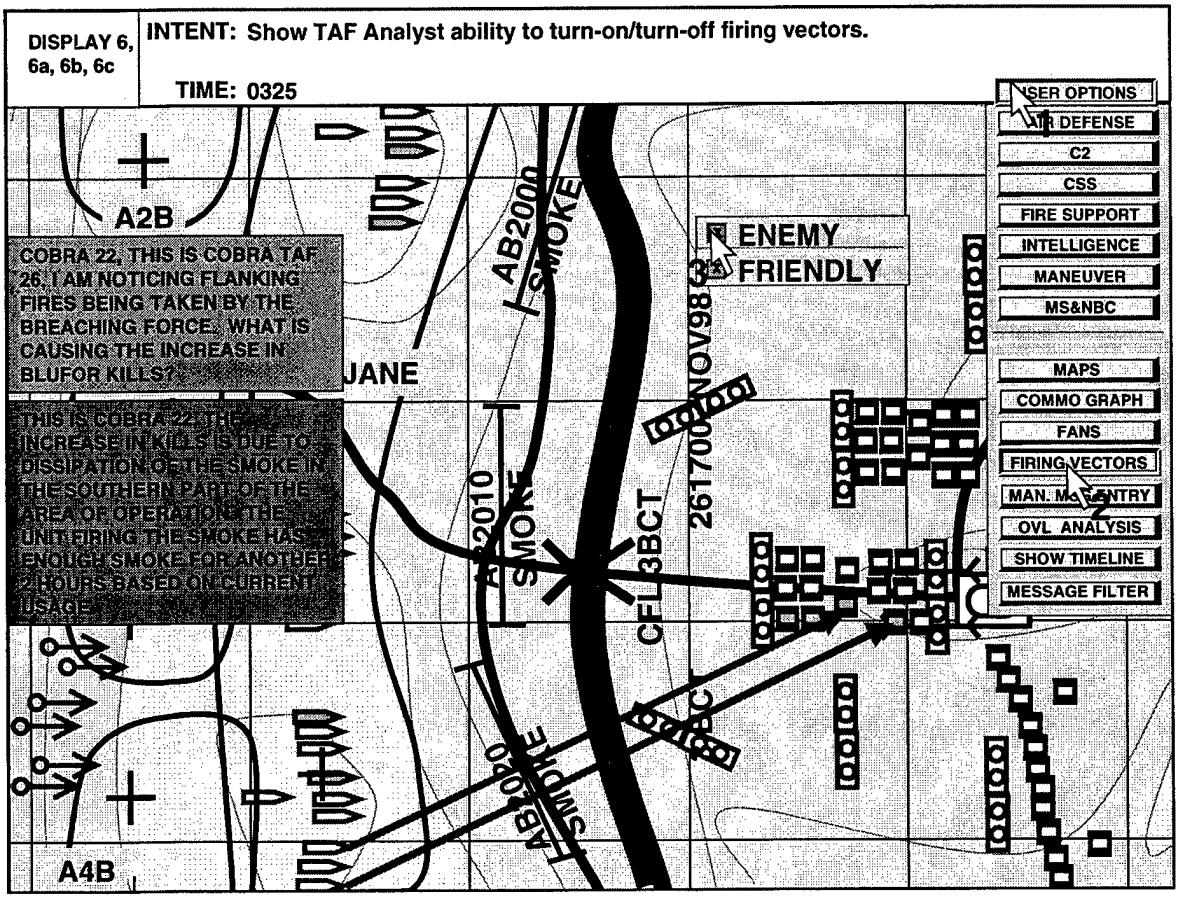
The focus of the FS rehearsal is on the FS system from shooter to executor. It should address areas such as:
- **commo to observers and alternate nets.**
- **observer locations.**
- **target lists and schedules.**

Reference: FM 6-71, ST 6-3

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show TAF Analyst ability to turn-on/turn-off firing vectors.

AFATDS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Fire Support Overlay.	**DISPLAY 6 :** Ground truth of the BCT area of operation under Fire Support Overlay. Zoomed-in map and vehicle resolution on BN/TF 3-5 and enemy units. TRIGGER. Selection of + magnifying glass and selection of CO/TM.		**X**		**DISPLAY 6a :** *Pull-Down Menu.* Provides user capability to select specific BOSs and their specific requirements or general areas, such as commo graphs, firing vectors, etc. TRIGGER. User selects **USER OPTIONS** to reveal his options. **DISPLAY 6b :** *Enemy Friendly Selection.* Allows user to select/ unselect side to display firing vectors for. TRIGGER. User selects **FIRING VECTORS** . **DISPLAY 6c :** *Firing Vectors.* Shows designated-force-firing vectors for each vehicle completing an accurate hit. TRIGGER. User selects **ENEMY, FRIENDLY** or both.		**X**	



SCENARIO. The BCT has been fighting for the last 25 minutes. Bn TF 2-2 has breached the first minefield and has begun clearing the second along the road. The unit assigned to breach the northern minefield has arrived and is also beginning to breach it. The lead breaching unit along the road is beginning to take accurate fire.

TAF ANALYST/WORKSTATION ACTIONS. When the Analyst sees the first friendly tank go gray, he decides to enable enemy firing vectors to see where the fire is coming from. To enable firing vectors for the enemy, he selects **USER OPTIONS**, **FIRING VECTORS**, **ENEMY**. As he is watching the battle, he notices the enemy scoring accurate hits on friendly forces along the road. He calls the respective OCs to discover if the smoke has begun to diminish, and whether or not it is because of the expending of rounds in that area or due to another problem. The OC tells the Analyst the smoke has decreased, causing the enemy fires to increase. He tells the Analyst the firing unit has enough smoke, based on current usage, to last another 40 minutes. The

Analyst remembers that the analysis of the smoke mission pointed out that the firing unit would not have enough smoke to last the 45 minutes. Since the battle has been going on for 25 minutes, with 20 minutes left for the smoke, the Analyst deduces that the observer has not been calling enough smoke in on the target (the firing unit has 40 minutes of smoke left).

C4I PERFORMANCE ASSESSMENT MATRIX

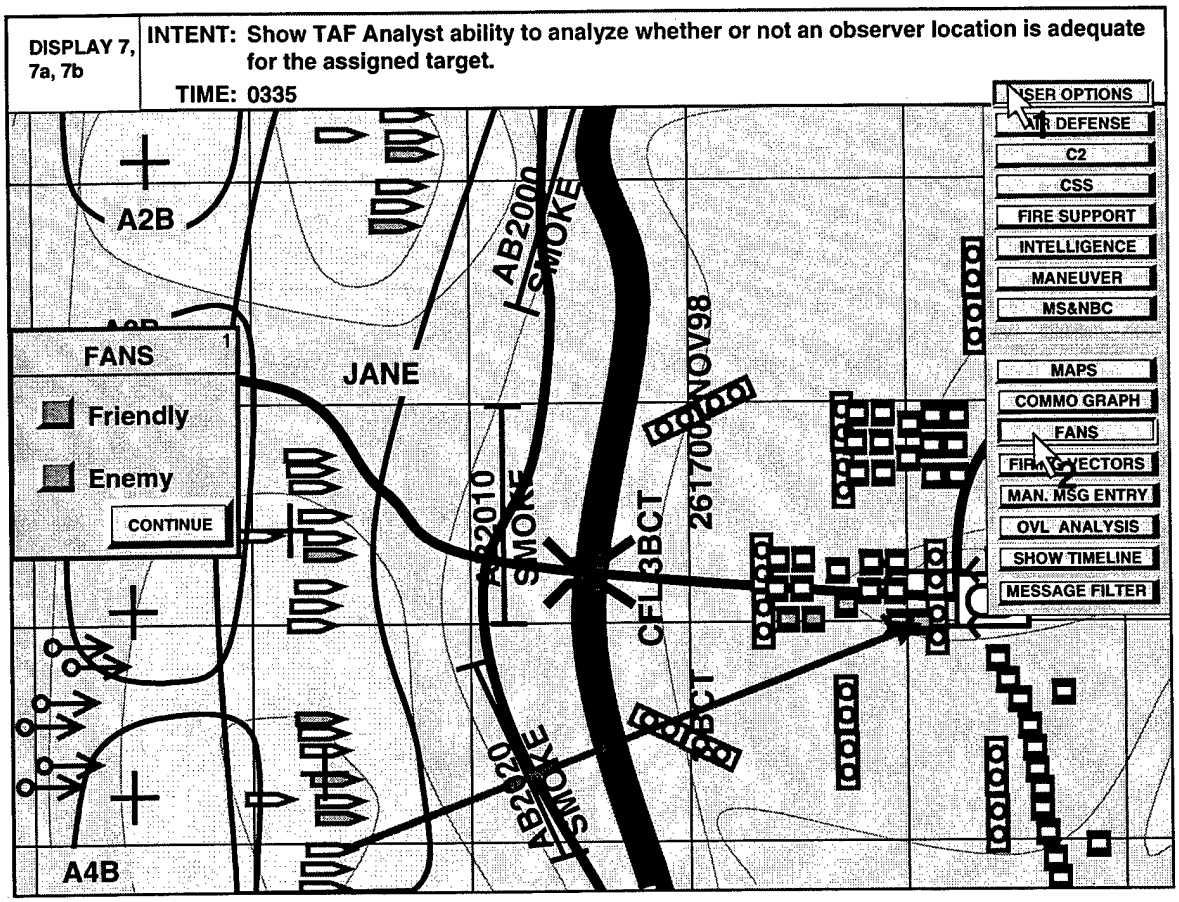
INTENT: Show TAF Analyst ability to analyze whether or not an observer location is adequate for the assigned target.

AFATDS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Fire Support Overlay.	**DISPLAY7 :** Ground truth of the BCT area of operation under Fire Support Overlay.		X		**DISPLAY7a :** *Pull-Down Menu.* Provides user capability to select specific BOSs and their specific requirements or general areas, such as commo graphs, firing vectors, etc. TRIGGER. User selects **USER OPTIONS** to reveal his options. **DISPLAY7b :** *Selection Box.* Allows user to select friendly or enemy fans to be shown. TRIGGER. User selects **FANS**. **DISPLAY7c :** *Selection Box.* Allows user to select either weapon or observation fan to be shown. TRIGGER. User selects **ENEMY, FRIENDLY** or both and then **CONTINUE**		X	

C4I PERFORMANCE ASSESSMENT MATRIX

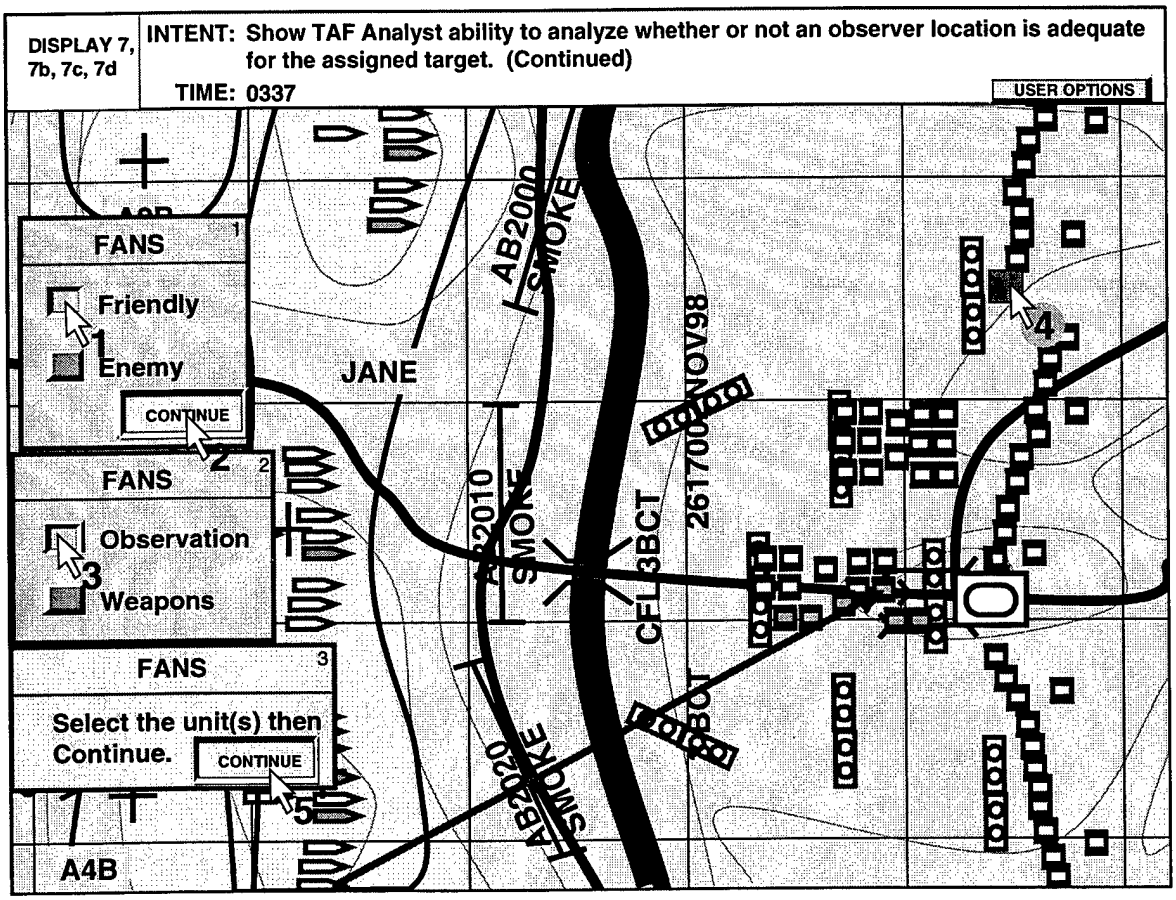
INTENT: Show TAF Analyst ability to analyze whether or not an observer location is adequate for the assigned (CONTINUED).

AFATDS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Fire Support Overlay.	**DISPLAY7 :** Ground truth of the BCT area of operation under Fire Support Overlay.		X	X	**DISPLAY7d :** *Instruction Dialog Box.* Informs user to select units he wishes to have fans constructed for. TRIGGER. User selects either **Observation** or **Weapons.** **DISPLAY7e :** *Observation/Weapon Fan.* The observation or weapon fan appears for the unit(s) selected. TRIGGER. User selects unit(s) for fans to be constructed for, then selects **CONTINUE** **DISPLAY7f :** *Legend.* Informs user of symbols used for the fan(s) TRIGGER. System constructs fan(s) and creates "Legend."		X	X



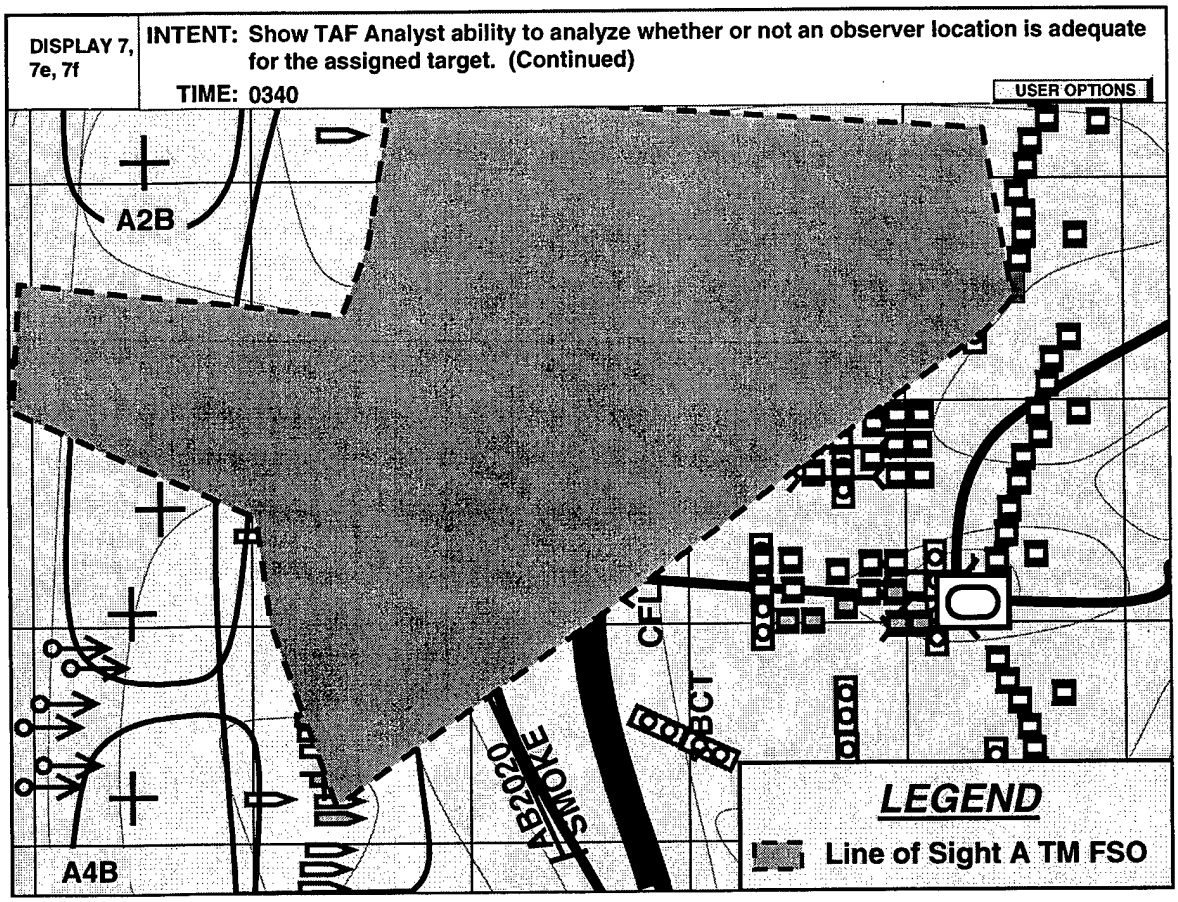
SCENARIO. The lead breaching unit along the road continues to take accurate fire.

TAF ANALYST/WORKSTATION ACTIONS. With the information received from the OC, the Analyst decides to determine if the observer has a good field of view to be able to call the smoke on AB2020. He selects **USER OPTIONS**, and then **FANS**. The system displays the dialog box "FANS [1]."



SCENARIO. The lead breaching unit along the road continues to take accurate fire.

TAF ANALYST/WORKSTATION ACTIONS. Continuing the process, the Analyst selects **Friendly**, **CONTINUE**, **Observation**, the location of the observer of AB2020, and **CONTINUE**.



SCENARIO. The lead breaching unit along the road is about halfway through the second minefield. The northern breaching unit has completed the breach and is now going through it.

TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects the final **CONTINUE**, the system displays the area the observer can see. The Analyst notes the observer cannot see the southernmost part of AB2020 to be able to tell when the smoke is getting too thin, allowing the enemy to see through.

DISCUSSION POINTS FOR AAR DISPLAY 7

WHAT HAPPENED:(Trainer Entry)

The observer position is inadequate to properly execute target AB2020.

FACILITATING QUESTIONS (WHY IT HAPPENED)(System Entry)

1. Was the position of the assigned observer changed after the assignment was made?

2. Was the location of the observer ever raised as a problem?

3. Was a fire support rehearsal, including observers, conducted?

HOW TO IMPROVE:(System Entry)

If it is important enough to target, it is important enough to have eyes on target. At the Co Tm level, the commander is responsible for ensuring assigned targets are observed, have a trigger, and are rehearsed.

The Co Tm FSO coordinates observers, monitors the situation, ensures the focus of fires is maintained, and assists in the positive clearance of fires.

Reference: FKSM 71-2-1 (EXFOR)-MTP, FM 6-71

APPENDIX C:
ALL SOURCE ANALYSIS SYSTEM (ASAS)
BATTALION TRAINING SCENARIO

The entries for the ASAS TASK MATRIX are taken from various sources. Information for the TASK and KEY ELEMENTS column is taken from chapter 5 of FKSM 71-2-1 -(EXFOR) - MTP, *Mission Training Plan for the EXFOR Digital Tank and Mechanized Infantry Battalion Task Force*. Entries for the APPLICABLE TTP column were taken from FKSM 7-2-1 (EXFOR), *The Digitized Heavy Battalion*; FM 34-130, *Intelligence Preparation of the Battlefield (IPB)*; and FM 101-5, *Staff Organization and Operations*. The input for the ASAS INPUT AND OUTPUT column came from the *ASAS Digital Operators Guide (DOG)* posted on the TPIO ABCS Training web site. If there are no entries for the column, no information was found to support the TTP by the ASAS.

The intent of each display illustrated in this appendix is stated below.

Display 1. INTENT: Show the accuracy of intelligence during the planning phase of the operation by crosswalking ASAS products with IS ground truth before the battle begins. Show the age of BLUFOR intelligence information.

Display 2. INTENT: Show how the battle unfolded and how well BLUFOR was able to envision COAs by showing the actual OPFOR dispositions, maneuver and firing activity in contrast with ASAS graphics. The display also shows BLUFOR's skills in identifying NAIs that will identify enemy intentions. Display 2a shows the S2's event matrix predicting timeframes for OPFOR activity at each NAI.

Display 3. INTENT: Show BLUFOR's ability to post and relay enemy information and to react to late-breaking enemy actions. Also may shed light on actions not taken by units due to unreceived messages.

Display 4. INTENT: Show how closely ASAS display mirrors the actual OPFOR obstacles.

ASAS Task Matrix

TASK	KEY ELEMENTS	APPLICABLE TTP	ASAS INPUT AND OUTPUT
The S-2 prepares the intelligence estimate	1. Defining the Battlefield Environment	The area of interest (AOI) must be established which includes the terrain in which activity may occur that would affect the upcoming mission.	Create Geographical Areas USER INPUT: Select either named area of interest (NAI) or target area of interest as the type of area to create. Pick the points, plot the area and name it.
			ASAS OUTPUT: The geographical areas are now available for queries and criteria.
			Create an AOI USER INPUT: Select the map point needed to depict the area of interest desired and name it.
			ASAS OUTPUT: The AOI will appear on the map.
The S-2 prepares the intelligence estimate.	2. Describing the Battlefield Effects.	The S2 begins his analysis by preparing a modified combined obstacles overlay (MCOO) and avenue of approach (AA) overlay then provides the information to other staff elements' Army Tactical Command and Control Systems (ATCCS) to assist in friendly and enemy course of action (COA) development. Using the Appliqué, the S2 transmits the MCOO and AAs to the brigade combat team (BCT) commander.	Create an Automatically Generated MCOO USER INPUT: Select the AOI desired and outline the area for the MCOO. Set the desired parameters, draw the man-made obstacles and save draw objects as overlay.
		Products are: mobility corridors AAs Defensible terrain Key and decisive terrain Weather / politics Objective areas Concealed assault positions Infiltration lanes, landing zones (LZ)s Choke points Close terrain	ASAS OUTPUT: Designates terrain as GO, SLOW-GO, NO GO. It also shows known routes and trails.

ASAS Task Matrix

TASK	KEY ELEMENTS	APPLICABLE TTP	ASAS INPUT AND OUTPUT
The S-2 prepares the intelligence estimate.	3. Evaluating the Threat.	Construct order of battle files using the following tools: intelligence files, situation map (SITMAP), coordinates register, intelligence journal, intelligence workbook, activities matrix, association matrix, link diagram and time event chart.	
		- Document the Threat Model: standard graphic control measures, training of the enemy units.	USER INPUT: Select the proper category of battlefield geometry. Select locations and the control measure.
			ASAS OUTPUT: Map depicts all control measures input.
The S-2 prepares the intelligence estimate.	3. Evaluating the Threat (continued).	Develop a doctrinal narrative - describe the tasks that each subordinate OPFOR unit will accomplish during the operation. The written narrative can be expressed either in paragraph form or in a standard synchronization matrix that has OPFOR units on one axis and time duration on the other axis, develop high value targets (HVT)s based on doctrine.	
		- Doctrinal Template: the deployment pattern and disposition preferred by the threat's normal tactics when not constrained by the effects of the battlefield environment. Some doctrinal templates consider the threat unit or force as a whole, while others focus on a single battlefield operating system (BOS), such as intelligence or fire support.	
The S-2 prepares the intelligence estimate.	4. Determining Threat COA.	A threat COA model has three components: situational template, situational narrative and situational HVTs.	Mobility Corridor Analysis USER INPUT: Select a previously created speed evaluation for the AOI, or create a new one by Selecting the type of unit and parameters, travel requirements, movement plans, speed, smallest object, mobility corridor, start axis and 3 objectives.
		- Situational Template contains threat model, doctrinal template, MCOO and threat COAs.	ASAS OUTPUT: Depicts the results in color according to the posted legend.

When building the ASAS Bn TF example, we created the C4I PERFORMANCE ASSESSMENT MATRIX second, after completing the ASAS TASK MATRIX. Initially we had the INTENT at the bottom instead of at the top. We moved it to the top to give the reader more of an idea of the story the displays below were trying to tell. This table describes ASAS data and other information the TAF analyst must view or hear to assess the S2's performance. The matrix describes the information the TAF workstation should display and indicates when the workstation should present the information to the analyst. This matrix drove the design of the illustrations we developed in the third step of our methodology.

CONVENTIONS: As you proceed through the MCS scenario, you will view proposed displays to assist the training analyst monitor digital communications and assess BLUFOR performance. Below each display is a narrative which addresses the training analyst's interactions with the TAF workstation as he observes BLUFOR digital actions and inactions during the exercise. We will use the conventions below in our narration of various display features and user interface functions as we discuss the trainers interaction with the displays.

BOLD text- represents analyst selection of an item (mouse click)

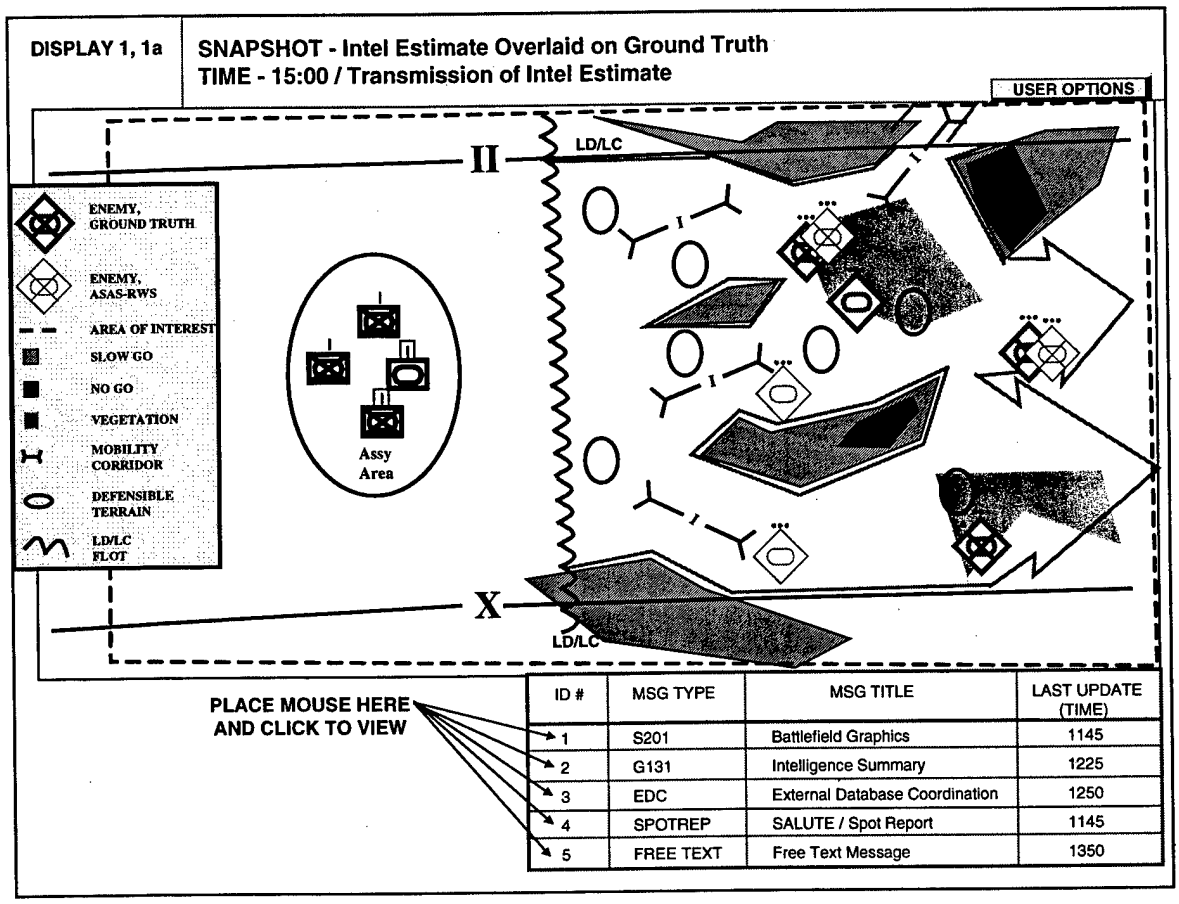
Italics - represents analyst-entered data

"Quotes" - represents names of dialog boxes

C4I PERFORMANCE ASSESSMENT MATRIX

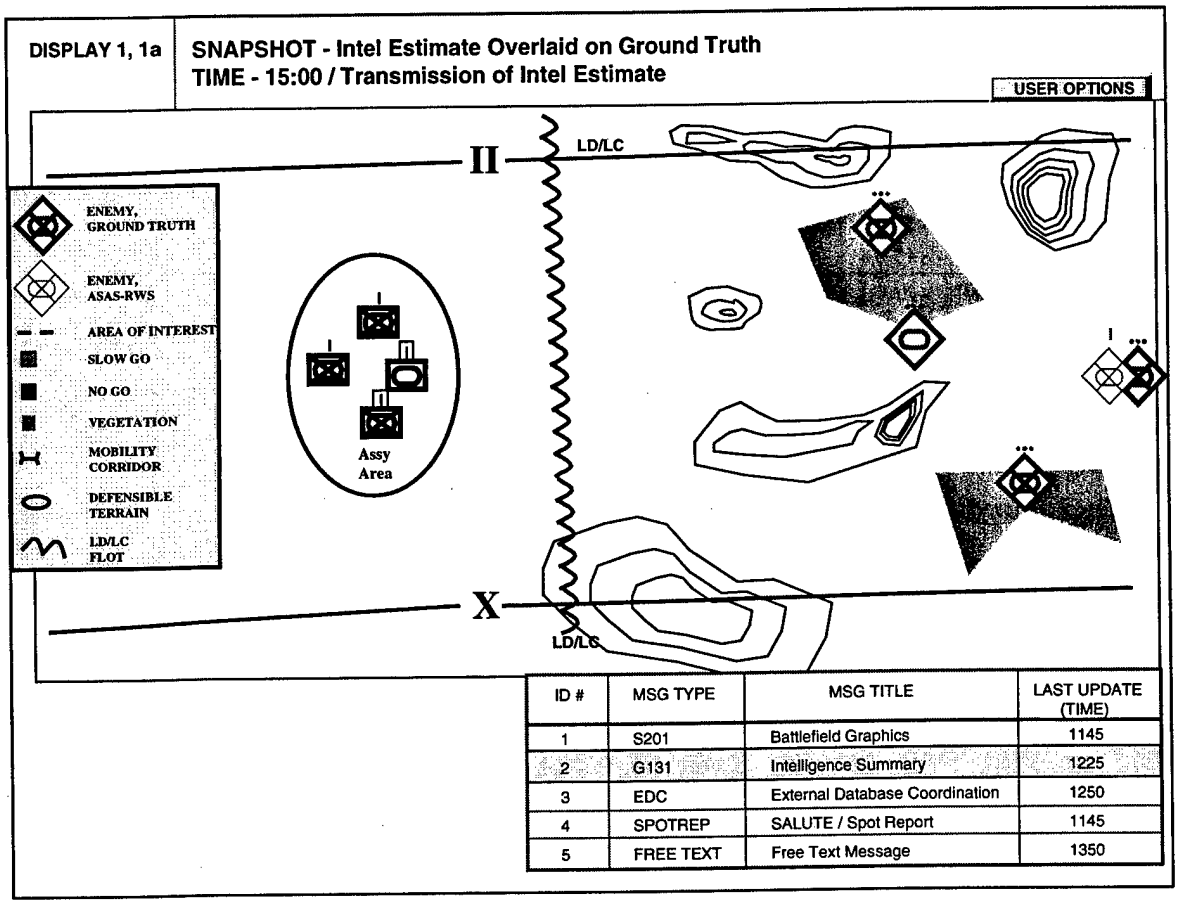
INTENT: Show the accuracy of intelligence during the planning phase of the operation by crosswalking ASAS products with instrumentation system (IS) ground truth before the battle begins (Display 1). Show the age of BLUFOR intelligence information (Display 1a).

ASAS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Area of Interest, battlefield graphics, reported enemy locations, AAs, mobility corridors and defensible terrain from Intel Estimate.	**DISPLAY 1 :** ***Snapshot Aid.*** Shows the area of interest and the actual locations of both friendly and enemy units. The snapshot is taken at the same time the Intel Estimate is transmitted. TAF Workstation overlays ASAS graphics on IS ground truth.	X	X	X	**DISPLAY 1a :** ***Table Aid.*** Portrays DTG of the most recent Battlefield Graphics (S201), Intelligence Summaries (G131) and External Database Coordination (EDC) from higher headquarters, SPOTREPs, and Free Text concerning enemy activity. Timing - Display in real time as the S2 receives the messages.	X	X	X

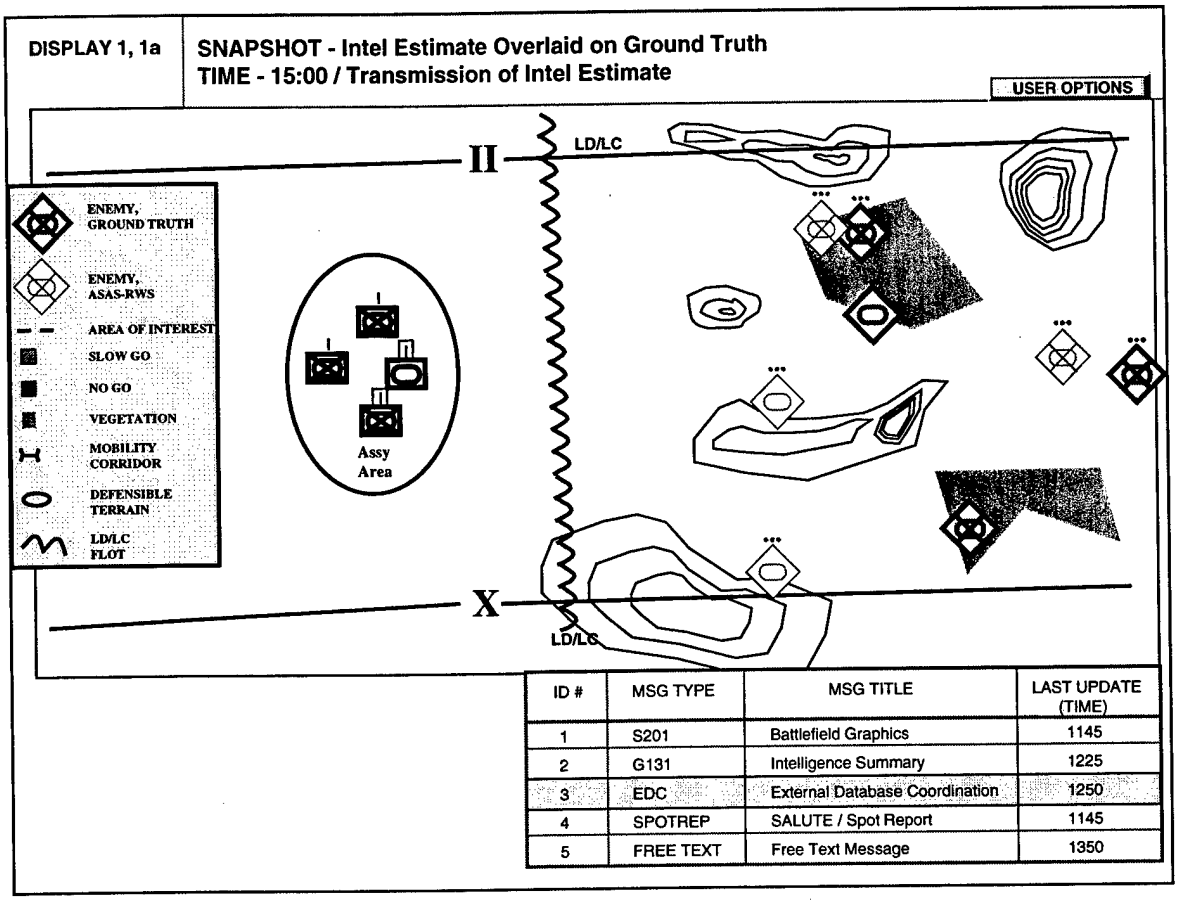


TAF ANALYST/WORKSTATION ACTIONS. The workstation alerts the TAF analyst to intelligence preparation of the battlefield (IPB) products that the Bn TF S2 digitally transmitted to higher, adjacent, lower and supporting units. The workstation superimposes a combination of S2 digital overlays over actual OPFOR dispositions provided by the IS. The workstation shows the accuracy of the S2's intelligence estimate prior to the initiation of the BLUFOR attack. The table below the graphical display is a digital message log. As the IS eavesdrops on BLUFOR digital traffic, the workstation posts header information about each message in the message log. The TAF analyst may view the contents of a message by clicking on the message ID number.

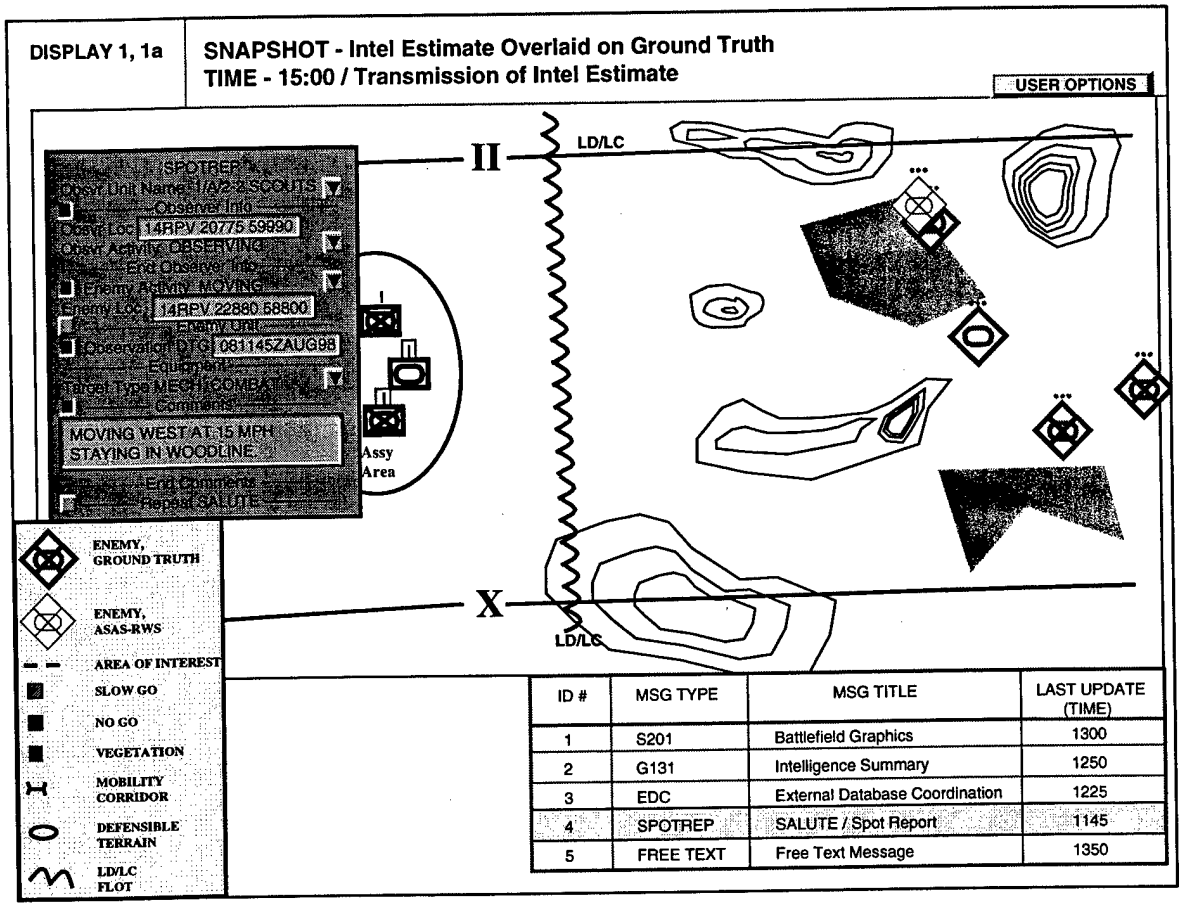
SCENARIO. The Bn TF is still in the assembly area preparing for mission execution.



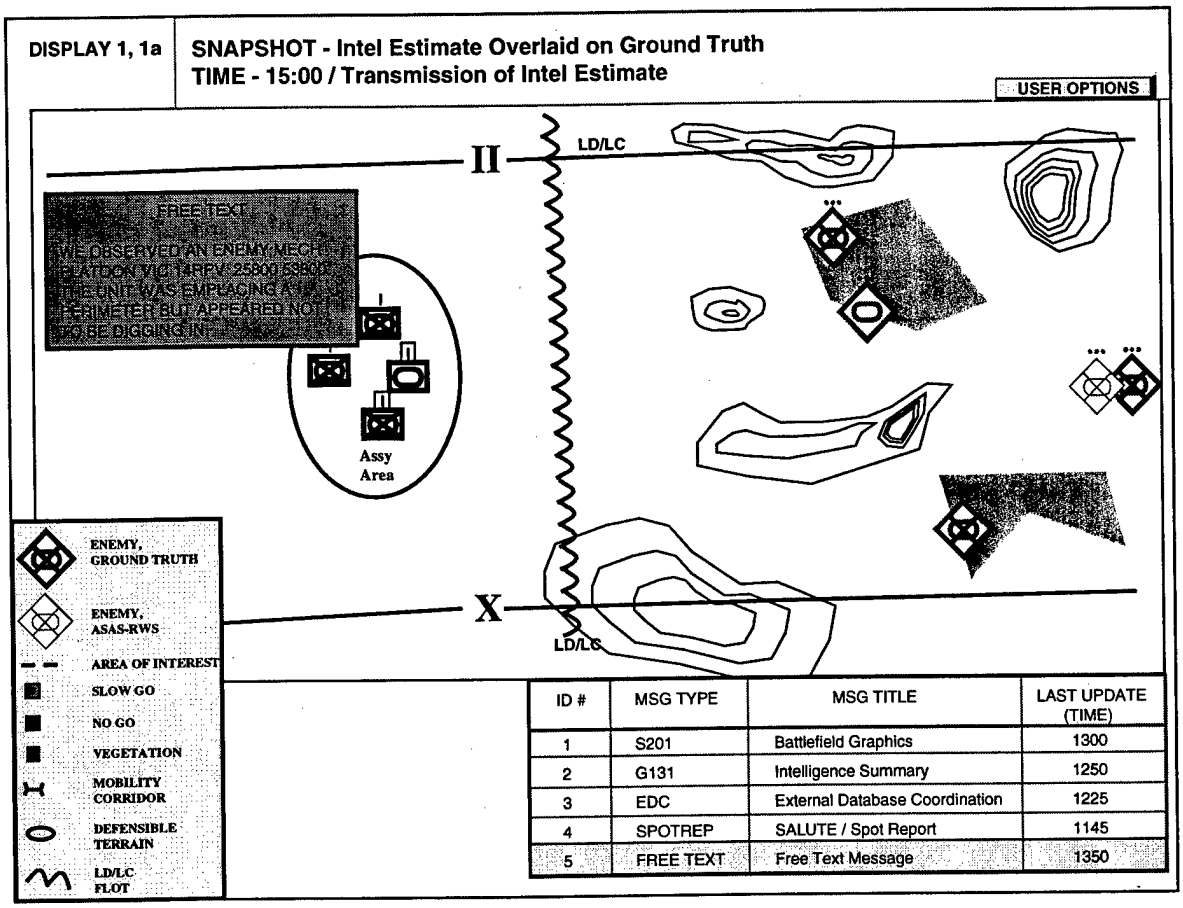
TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst selected **ID #2** in the previous display. When he did so, the workstation displayed the above, showing the latest intelligence summary over ground truth at the time of the estimate.



TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst selected **ID #3** in the previous display. When he did so, the workstation displayed the above, showing the latest external database coordination (EDC) - a message sent from an ASAS in the ACE coordinating all subordinate ASASs to the same enemy common picture - over ground truth at the time of the EDC.



TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst selected **ID #4** in the previous display. When he did so, the workstation displayed the above, showing the latest SALUTE / SPOTREP over ground truth display at the time of the report.



TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst selected **ID #5** in the previous display. When he did so, the workstation displayed the above, showing the latest FREE TEXT message over ground truth display at the time of the report.

DISCUSSION POINTS FOR AAR DISPLAY 1

WHAT HAPPENED: (Trainer Entry)

Of the four OPFOR units templated or reported within the task force's area of interest, you located and identified two units accurately. Your locations for two OPFOR units were inaccurate, and one of the two was inaccurately identified (as armor vice mech). This impacted on the targeting of indirect fires to support the attack.

FACILITATING QUESTIONS (WHY IT HAPPENED) : (System Entry)

1. What assets were available to the task force for intelligence gathering?
2. Were there any assets available that were not used?
3. Were the enemy units templated, or were their locations taken directly from reports and higher Intel Estimates?
4. What was done to disseminate late-breaking intelligence information?

HOW TO IMPROVE: (System Entry)

Although higher headquarters may send intelligence data, it is not always responsive or accurate enough to support battalion or lower level operations. You must also perform IPB. Simply waiting for the intelligence to flow will not satisfy your commander's priority information requests (PIR). Use intelligence reports to confirm and adjust your IPB. Not only will this practice hone your skills, it will cause you to ask questions to more accurate information.

Ensure you maximize the use of all collection assets that are available. Some of the assets that may be available to you are: task force subordinate and supporting units; unmanned aerial vehicle (UAV); Ground Based Common Sensor (GBCS); Advanced QuickFix (AQF); and/or Improved, Remotely Monitored Battlefield Sensor System (IREMBASS).

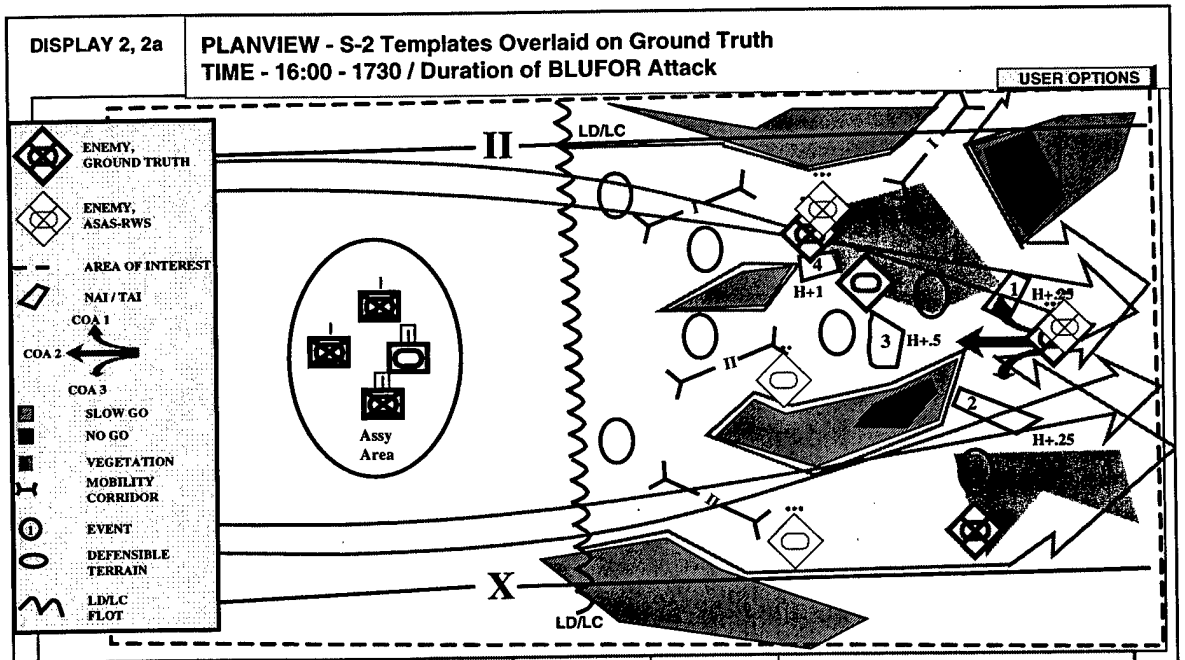
Reference: FM 34-130, FKSM 71-2-1 (EXFOR)

TAF ANALYST/WORKSTATION ACTIONS. The analyst completes the WHAT HAPPENED portion of the DISCUSSION POINTS FOR AAR DISPLAY for Display 1 and 1a. The workstation "knows" there is a discrepancy between ground truth and perceived truth and generates questions pertaining to intelligence accuracy. It also goes through the database to find HOW TO IMPROVE and places related entries in this portion of the aid. Data in this database comes from reports generated by the Center for Army Lessons Learned (CALL), OC experiences, and other sources that study the subject of tactics, techniques, and procedures. The analyst has the ability to add/modify/delete questions and add/modify/delete HOW TO IMPROVE comments entered automatically by the workstation.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: The TAF workstation operator observes these displays during the BLUFOR attack. Display 2 shows how the battle unfolded and how well BLUFOR was able to envision COAs by showing the actual OPFOR dispositions, maneuver and firing activity in contrast with ASAS graphics. The display also shows BLUFOR's skills in identifying NAIs that will identify enemy intentions. Display 2a shows the S2's event matrix predicting timeframes for OPFOR activity at each NAI.

ASAS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Area of Interest, battlefield graphics, reported enemy locations, AAs, mobility corridors, slow-go and no-go terrain and defensible terrain.	**DISPLAY 2 :** ***Plan View Aid.*** Depicts the battle that was planned overlaid on an animation of actual BLUFOR and OPFOR movement and firing activity. Plan View depicts each OPFOR template and OPFOR estimate upon transmission.	X	X		**DISPLAY 2a :** ***Table Aid.*** Shows the S2's Event Template.	X	X	



EVENT MATRIX

NAI #	NO EARLIER THAN	NO LATER THAN	INDICATOR
NAI 1	H	H+1	Combat Recon Patrol conducts route recon
NAI 2	H	H+1	Rifle platoon in march formation
NAI 3	H	H+1	Engineer preparation of minefield
NAI 4	H+.5	H+1.5	Tank platoon in march formation

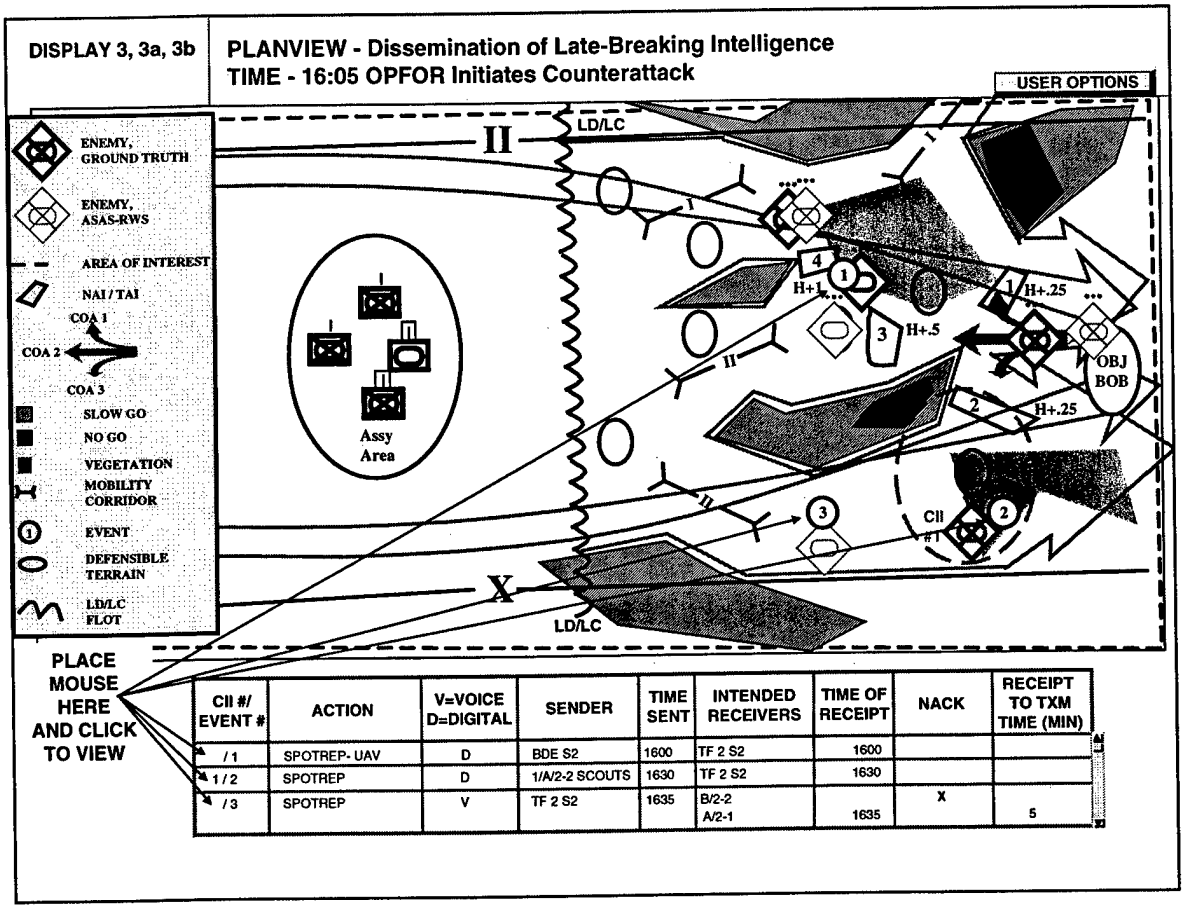
TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst combined the S-2 templates over the ground truth. He notices the middle and southern sectors do not mirror ground truth, and the

southern sector has a completely different type of unit than expected by the Bn TF.

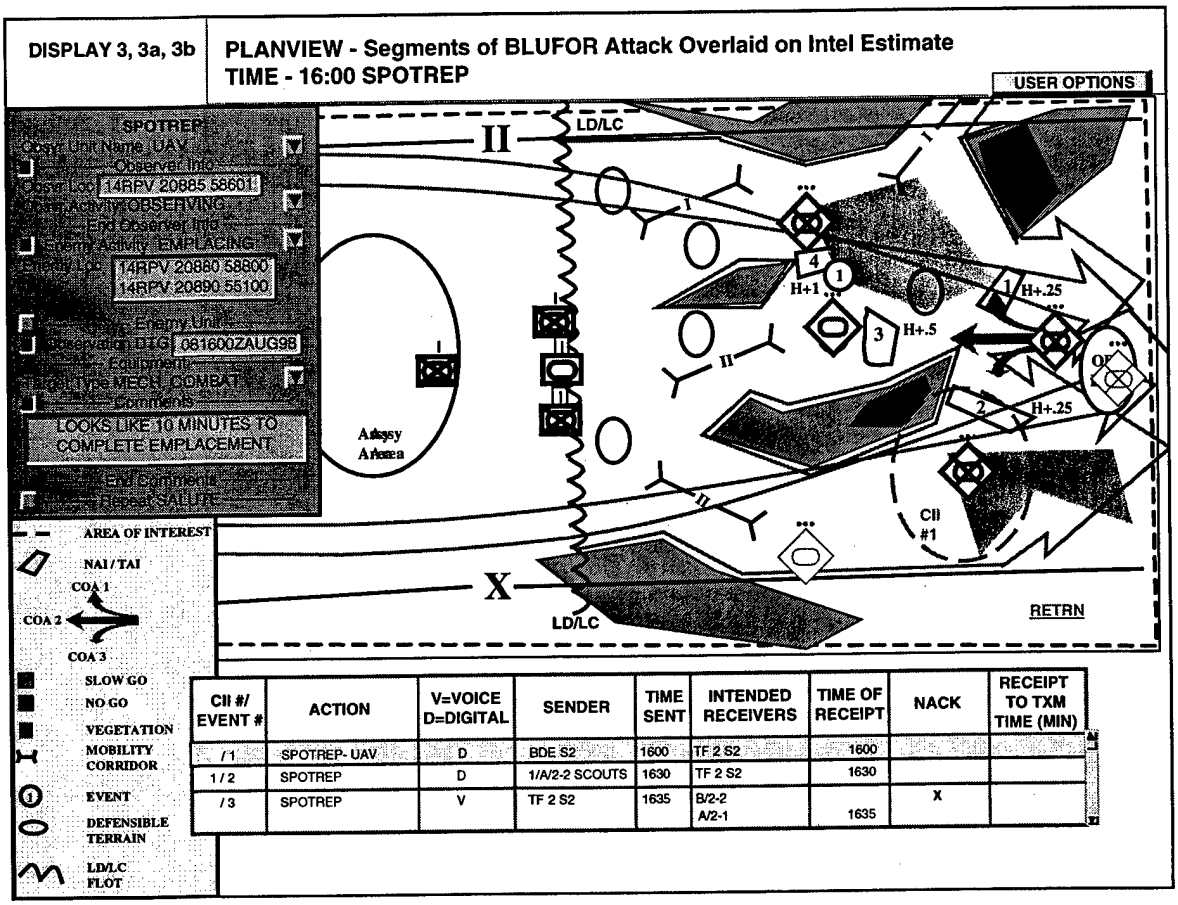
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: To show BLUFOR's ability to post and relay enemy information and to react to late-breaking enemy actions. Also may shed light on actions not taken by units due to unreceived messages.

ASAS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Area of Interest, battlefield graphics, reported enemy locations, AAs, mobility corridors, slow-go and no-go terrain and defensible terrain.	**DISPLAY 3 : *Snapshot Aid.*** Shows late-breaking intelligence relating each message to the location of reported OPFOR activity. Before the execution of the battle, the TAF workstation operator designates Command Intelligence/ Information (CII) areas where there are major deviations between ground truth and the intelligence estimate based on actual BLUFOR and OPFOR dispositions. As the battle unfolds, the system will identify messages that are perinent to the CII. The operator may designate additional CIIs as required during the execution of the battle. CIIs provide the TAF analyst the capability to filter digital and voice communications by geographical areas he designates.	X	X	X	**DISPLAY 3a : *Table Aid.*** Depicts time players transmitted/received digital and voice messages and how quickly the players disseminated intelligence information -- particularly late-breaking intelligence. Shows players who did not receive a message. Also relates messages to CIIs designated by the TAF analyst. **DISPLAY 3b : *Voice and Digital Communications Aids.*** Operator may click on the event number on the map or in the table to view a voice or digital message.	X	X	X



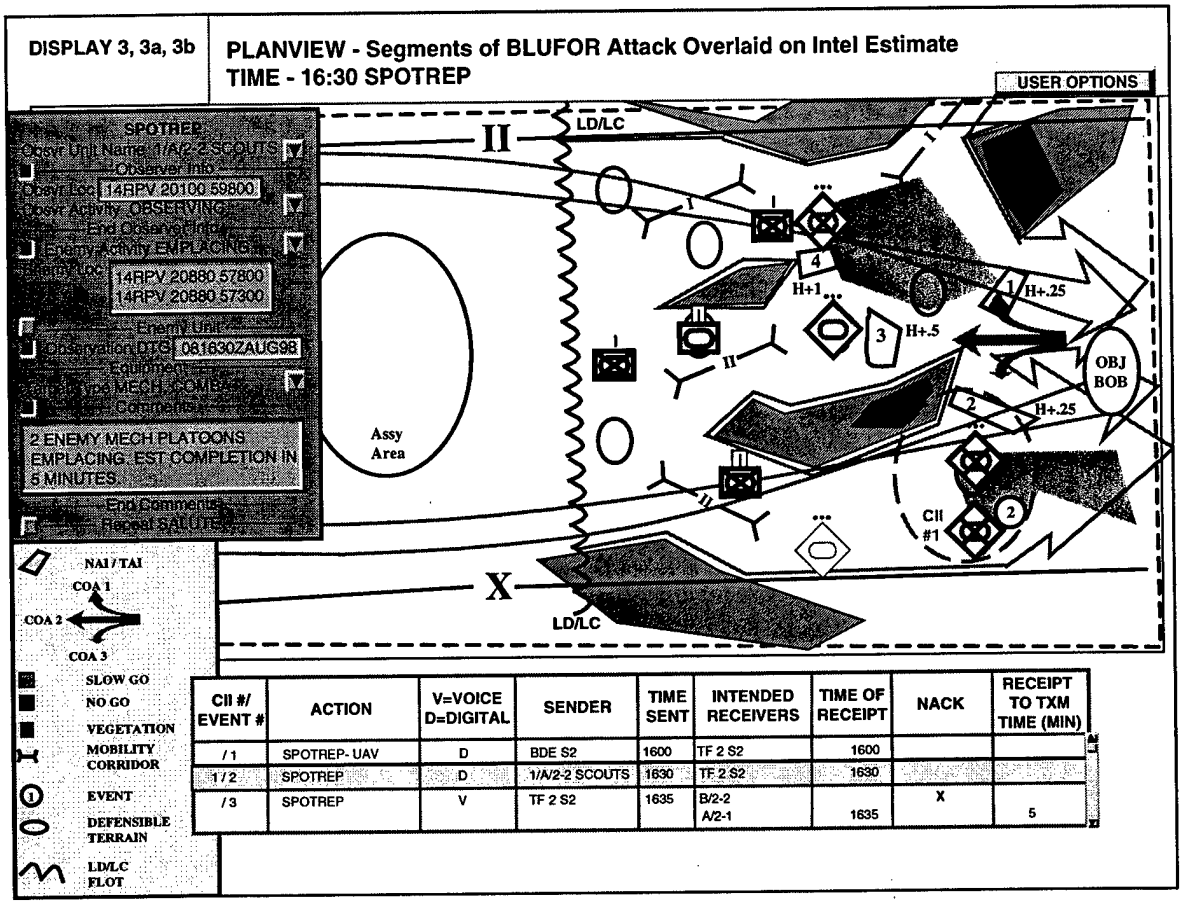
TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst designates **Command Intelligence/Information (CII)** areas where there are major deviations between ground truth and the intelligence estimate based on actual BLUFOR and OPFOR dispositions. As the battle unfolds, the system will identify messages that are pertinent to the CII. The analyst may designate additional CIIs as required during the execution of the battle. CIIs provide the capability for the TAF analyst to filter voice and digital communications by geographical areas he designates. As the workstation senses a message, whether digital or voice, it completes an entry in the message table, keeping a running record throughout the particular phase of battle. The workstation allows the analyst to scroll and review any message by clicking on the CII #/ EVENT # in the table.



CII #/ EVENT #	ACTION	V=VOICE D=DIGITAL	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	RECEIPT TO TXM TIME (MIN)
/1	SPOTREP- UAV	D	BDE S2	1600	TF 2 S2	1600		
1/2	SPOTREP	D	1/A/2-2 SCOUTS	1630	TF 2 S2	1630		
/3	SPOTREP	V	TF 2 S2	1635	B/2-2 A/2-1	1635	X	

TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst selects the **CII #/EVENT # /1** and the above display appears. The actual message appears, allowing the analyst to scroll through it. Upon initial receipt of the message, the workstation plots a circle with a number in the center corresponding to the "EVENT #" at the position where the reported action was taking place.

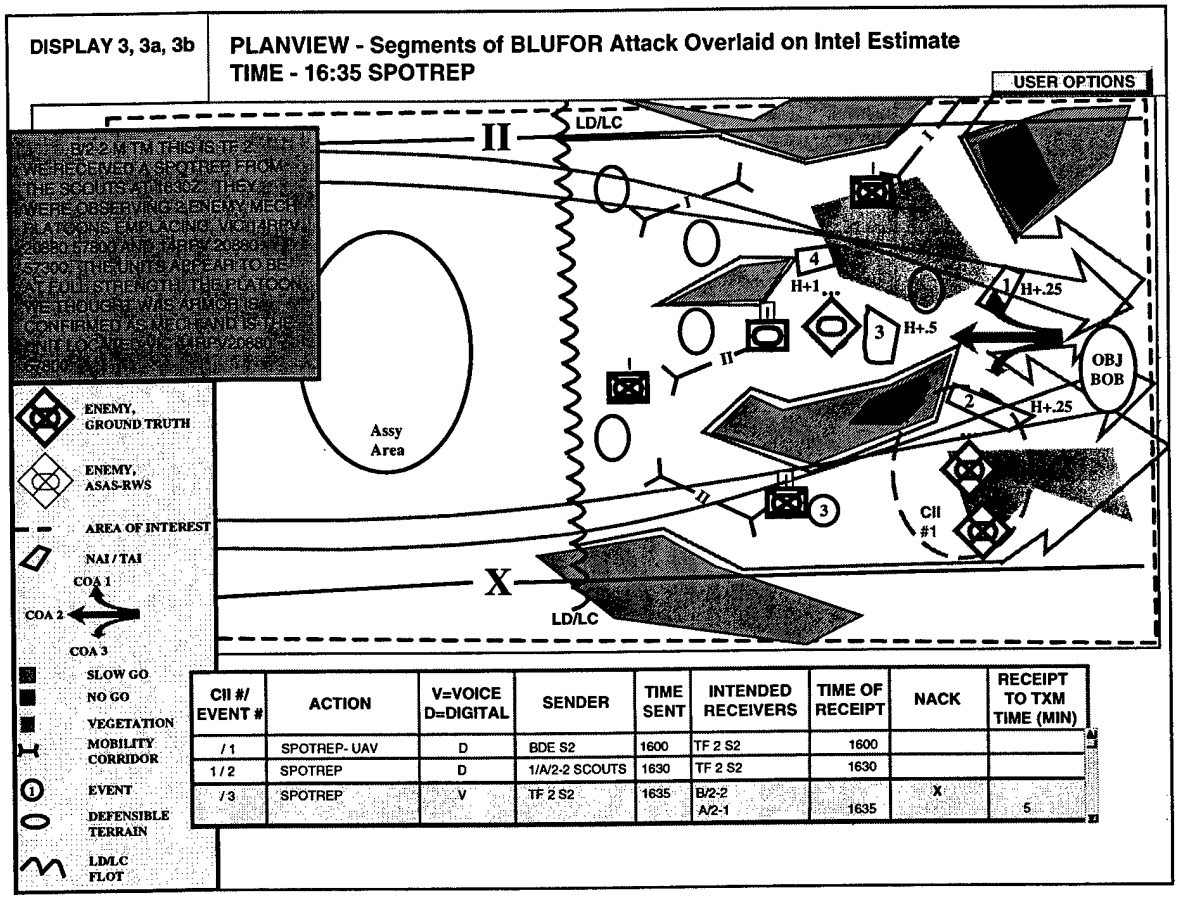
SCENARIO. Scouts and UAVs are gathering information on the enemy prior to mission execution.



CII #/ EVENT #	ACTION	V=VOICE D=DIGITAL	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	RECEIPT TO TXM TIME (MIN)
/1	SPOTREP- UAV	D	BDE S2	1600	TF 2 S2	1600		
1/2	SPOTREP	D	1/A/2-2 SCOUTS	1630	TF 2 S2	1630		
/3	SPOTREP	V	TF 2 S2	1635	B/2-2 A/2-1	1635	X	5

TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst selects the **CII #/EVENT # 1/2** and the above display appears. The actual message appears, allowing the analyst to scroll through it. Upon initial receipt of the message, the workstation plots a circle with a number in the center corresponding to the "EVENT #" at the position where the reported action was taking place. In this case, the SPOTREP is in the designated CII area so in the "CII #/EVENT #" box, 1/2 appears.

SCENARIO. The Bn TF has deployed. The follow and support company is waiting to be committed to one of the three sectors, depending on where the enemy appears to be committing its forces.



CII # / EVENT #	ACTION	V=VOICE D=DIGITAL	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	RECEIPT TO TXM TIME (MIN)
/1	SPOTREP- UAV	D	BDE S2	1600	TF 2 S2	1600		
1/2	SPOTREP	D	1/A/2-2 SCOUTS	1630	TF 2 S2	1630		
/3	SPOTREP	V	TF 2 S2	1635	B/2-2 A/2-1	1635	X	5

TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst selects the **CII #/EVENT # /3** and the above display appears. The actual message appears, in this case, a voice message. This capability assumes voice recognition has been improved significantly, and artificial intelligence/expert system enhancements have been made, allowing the workstation to convert voice-to-text, "know" the type of message being sent, and plot the event in the proper place. Upon initial receipt of the message, the workstation plots a circle with a number in the center corresponding to the "EVENT #" at the position where the reported action was taking place.

SCENARIO. This report from the Co Tm in the south causes the follow-on and support Co Tm to be committed in the south.

DISCUSSION POINTS FOR AAR DISPLAY 3

WHAT HAPPENED: (Trainer Entry)

There was no observation of NAI 2 until after the enemy unit had already passed through the NAI. As a result, the Task Force was late in committing the follow-and-support Co Tm to respond to the enemy counterattack. BLUFOR attacking along the southern portion of the zone sustained heavy losses.

FACILITATING QUESTIONS (WHY IT HAPPENED) : (System Entry)

1. **What process did you use to pick the NAIs/TAIs?**
2. **What surveillance assets did you acquire and allocate to each NAI?**
3. **How did you plan to observe NAIs in the event the primary surveillance asset was unavailable?**
4. **Did you know who failed to receive your digital message traffic?**

HOW TO IMPROVE: (System Entry)

Place NAIs at locations that will reveal how the enemy plans to commit his forces. The NAI should provide sufficient time for BLUFOR to react to enemy actions The NAI should also be of a sufficient size to encompass the nature of enemy activity suspected.

Develop a reconnaissance and surveillance (R&S) planning cell consisting of the Assistant S3, Assistant S2, Assistant S1/S4 and other staff officers in areas that may have an impact on R&S planning and execution. This organization will give R&S the attention it needs to be thorough and successful.

Allocate supporting surveillance assets to each NAI. Coordinate surveillance coverage by BDE assets. Develop a plan to cover NAIs with alternate resources in the event the primary surveillance asset is unavailable or not in a position to observe.

Perform an analysis of terrain to see where communications dead space may be anticipated. Have all FBCB2 users set their FBCB2 to acknowledge receipt of messages. If no acknowledgements received, voice communications may be used or the message may be retransmitted digitally.

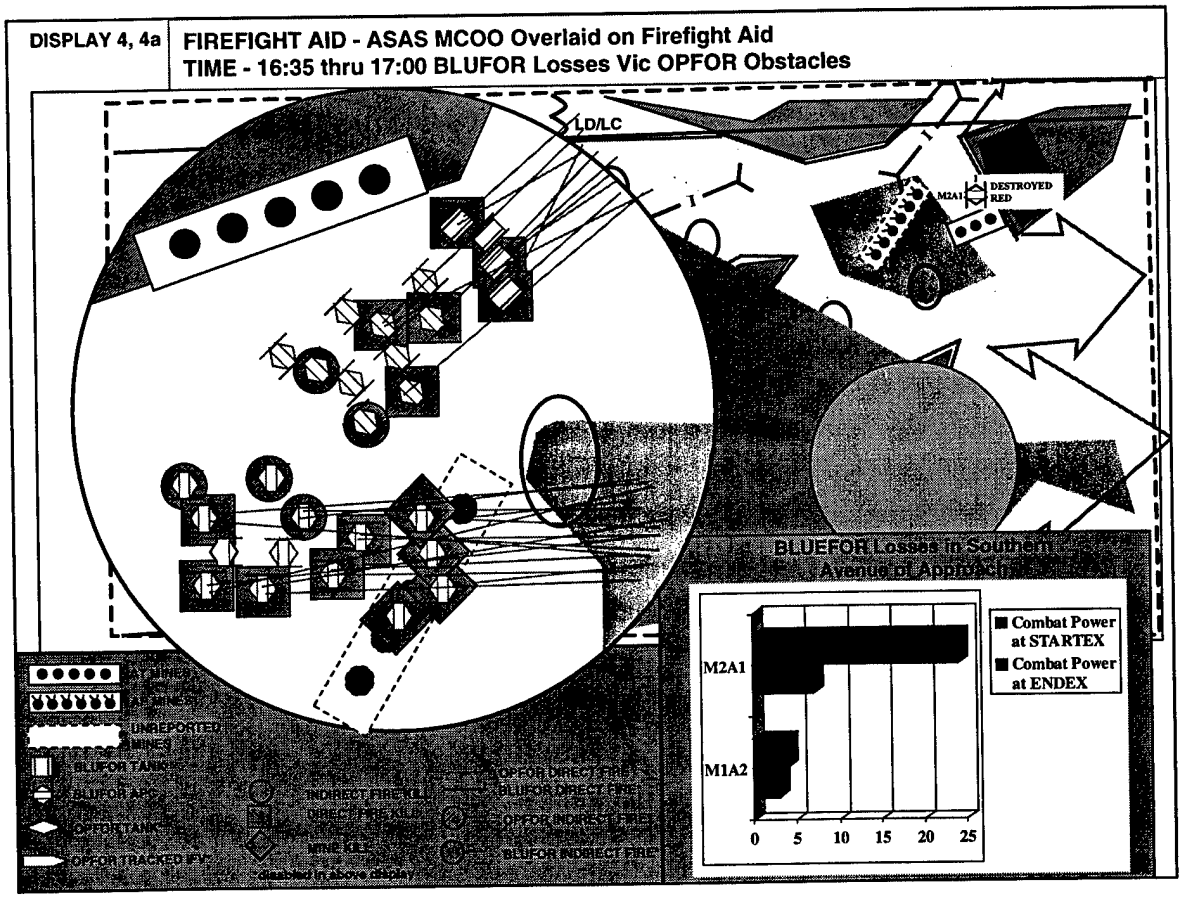
Reference: FM 34-130, FKSM 71-2-1 (EXFOR), CALL Newsletter

TAF ANALYST/WORKSTATION ACTIONS. The analyst completes the WHAT HAPPENED portion of the DISCUSSION POINTS FOR AAR DISPLAY for Display 3, 3a and 3b. The workstation "knows" there was no observation assigned to NAI 2. It goes through the database to find questions relating to the problem, and it also finds related HOW TO IMPROVE data and places related entries in this portion of the aid. Data in this database comes from reports generated by the Center for Army Lessons Learned (CALL), OC experiences, and other sources that study the subject of tactics, techniques, and procedures. The analyst has the ability to add/modify/ delete questions and add/modify/delete HOW TO IMPROVE comments entered automatically by the workstation.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: To show how closely the ASAS display mirrors the actual OPFOR obstacles.

ASAS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Area of Interest, battlefield graphics, reported enemy locations, AAs, mobility corridors, OPFOR counter-mobility obstacle system, slow-go and no-go terrain and defensible terrain.	**DISPLAY 4:** ***Firefight Aid.*** Snapshot depicting reported and undetected OPFOR obstacles. Aid shows OPFOR direct and indirect fire distribution and BLUFOR vehicles killed in OPFOR engagement area.			X	**DISPLAY 4a:** ***Graphic Aid.*** Shows the percentage of BLUFOR combat systems killed in vicinity of OPFOR obstacles.			X



TAF ANALYST/WORKSTATION ACTIONS. The TAF analyst creates an AAR aid by combining the MCOO, a firefight aid, and a table aid to show what happened to the two Co Tms operating in the south. He causes the workstation to enlarge the portion he wishes to concentrate on when creating the aid.

SCENARIO. The two Co Tms in the south are surprised by a minefield and the canalizing affect it had on their ability to maneuver.

DISCUSSION POINTS FOR AAR DISPLAY 4

WHAT HAPPENED: (Trainer Entry)

Of five OPFOR minefields, you located three. The unreported OPFOR minefield in the southern avenue of approach had a devastating effect on the BLUFOR attack. The minefield effectively channelized the lead BLUFOR Co Tm, resulting in the combat loss of 3 M1A2s and 4 M2A1s. The follow-and -support Co Tm lost 12 M2A1s.

FACILITATING QUESTIONS (WHY IT HAPPENED) : (System Entry)

1. Was the area covered by each NAI large enough to detect OPFOR minefield emplacement?

2. Was there adequate surveillance of each NAI?

3. Were engineer battlefield assessment products considered in your analysis of OPFOR's defense?

HOW TO IMPROVE: (System Entry)

Use engineer battlefield assessment products to predict the locations of enemy obstacles as well as ASAS terrain analysis products.

Employ Bn TF assets and request support from BDE surveillance assets to reconnoiter each NAI.

Develop a synchronized reconnaissance and surveillance plan that informs tasked surveillance assets of the expected time and type of enemy activity at each NAI.

Reference: FM 34-130, FKSM 71-2-1 (EXFOR), CALL Newsletter

TAF ANALYST/WORKSTATION ACTIONS. The analyst completes the WHAT HAPPENED portion of the DISCUSSION POINTS FOR AAR DISPLAY for Display 4 and 4a. The workstation "knows" there was a discrepancy between ground truth and perceived truth concerning minefields. It goes through the database to find questions relating to the problem, and it also finds related HOW TO IMPROVE data and places related entries in this portion of the aid. Data in this database comes from reports generated by the Center for Army Lessons Learned (CALL), OC experiences, and other sources that study the subject of tactics, techniques, and procedures. The analyst has the ability to add/modify/ delete questions and add/modify/delete HOW TO IMPROVE comments entered automatically by the workstation.

APPENDIX D
MANEUVER CONTROL STATION (MCS)
BATTALION TRAINING SCENARIO

We used various sources for completing the MCS BATTALION/TASK FORCE TASK MATRIX. We found information for the TASK and KEY ELEMENTS column in Chapter 5 of FKSM 17-2-1-(EXFOR), *MTP Mission Training Plan for the EXFOR Digitized Tank and Mechanized Infantry Battalion Task Force.* We used FKSM 71-1-1 (EXFOR), *The Digitized Tank and Mechanized Infantry Company Team,* and FKSM 71-2-1 (EXFOR), *The Digitized Heavy Battalion,* to complete the APPLICABLE TTP column. We completed the MCS INPUT AND OUTPUT column with information taken from the January 1998 *MCS Software Users Manual (SUM).*

The intent of each display illustrated in this appendix is stated below.

Display 1. INTENT: Show TAF Analyst ability to eavesdrop on brigade (BDE) video teleconference (VTC) among Bn TF commanders.

Display 2. INTENT: Show TAF Analyst actions to check MTP standards on transmission/receipt of warning orders.

Display 3. INTENT: Show if the unit adhered to the 1/3 - 2/3 planning rule.

Display 4. INTENT: Evaluate Bn TF Scout's route to OPs .

Display 5. INTENT: Show combat effectiveness (CE) prior to mission execution.

Display 6. INTENT: Show perceived truth and ground truth force ratios prior to mission execution.

Display 7. INTENT: Show a graphic display of communications during a defined time period.

Display 8. INTENT: Show unnecessary symbols and graphics on overlay.

Display 9. INTENT: Show TOC location and its relation to the battle.

MCS Battalion Task Force Task Matrix

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
COMMAND AND CONTROL THE BATTALION TASK FORCE (7-1-3901). (BN/TF leaders issue the warning order, using ABCS assets.) FKSM 71-2-1-(EXFOR)-MTP, p. 5-125.	1. Issue a complete warning order within 15 minutes of receipt of the brigade order.	The digitized BN/TF receives the mission in the form of an MCS warning order (WO). Upon receipt of the order, the commander and staff exchange information and conduct a preliminary METT-T analysis to gather pertinent information for the WO. WOs should be as timely and complete as possible; always include available graphics; include most current timeline; include updated enemy information. FKSM 71-2-1 (EXFOR) pp. 3-31 - 3-33.	Use the WO template resident in Word, complete the form, save and send.
COMMAND AND CONTROL THE BATTALION TASK FORCE (7-1-3901). (BN/TF commander develops and wargames courses of action, and selects one.) FKSM 71-2-1-(EXFOR)-MTP, p. 5-126.	2. Selects an appropriate course of action.	Once an analysis of the situation is complete, probable COAs are developed. When arraying friendly forces, a function of COA development, it is important to recognize that friendly-enemy planning ratios (combat power analysis) are unchanged by the fielding of digital units. With MCS, the BN/TF CDR and S3 have use of COA analysis and wargaming capabilities, such as force unit resource summaries, ratio estimates, mission definition, briefing tool, line-of-sight analysis, execution timeline, and travel time analysis. FKSM 71-2-1 (EXFOR) p. 3-35.	There are 3 major areas MCS can be used to assist in COA development: Terrain Evaluation, Unit Evaluation, and Situation Evaluation. Terrain Evaluation: All aspects of Observation, Cover and Concealment, Obstacles, Key Terrain, and Avenues of Approach (OCOKA) may be evaluated. Unit Evaluation: Assign combat effectiveness to all units after evaluating the CSS reports (gumball, chicklet, 18-wheeler, etc.), then use the Force Ratio tool to evaluate possible types of missions. Situation Evaluation: Travel time, direct fire fans, indirect fire fans, and aerial detection fans.

MCS Battalion Task Force Task Matrix

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
COMMAND AND CONTROL THE BATTALION TASK FORCE (7-1-3901). (BN/TF commander and staff issue the OPORD.) FKSM 71-2-1-(EXFOR)-MTP, p. 5-126.	3. Issue OPORD IAW one-third, two-thirds rule, and makes full use of available time.	The completed operations overlay, annotated with the BN/TF mission statement and limited instructions to subordinate units (task & purpose), is transmitted to company commanders in advance of the OPORD. The size of the screen on the FBCB2 prohibits a direct transfer of control measures from an acetate overlay to its FBCB2 equivalent and extensive graphics can cause the system to become sluggish or fail. Once the overlay is sent, the OPORD is sent. FKSM 71-2-1 (EXFOR) p. 3-37.	Use the OPORD template resident in Word, complete the form, save and send.

We developed the MCS scenario based on the tasks and TTP in the preceding Task Matrix. Following scenario development, we described displays to support the assessment of BLUFOR's employment of MCS for mission planning and execution using the C4I Performance Assessment Matrix shown above. Next we illustrated displays of each trainer alert and AAR aid. As we completed a set of displays, we updated the C4I Performance Assessment Matrix to describe the functionality that produced the displays and presentation timing. We developed separate illustrations with accompanying narrations to guide the reader through the scenario.

CONVENTIONS: As you proceed through the MCS scenario, you will view proposed displays to assist the training analyst monitor digital communications and assess BLUFOR performance. Below each display is a narrative which addresses the training analyst's interactions with the TAF workstation as he observes BLUFOR digital actions and inactions during the exercise. We will use the conventions below in our narration of various display features and user interface functions as we discuss the trainers interaction with the displays.

BOLD text- represents analyst selection of an item (mouse click)

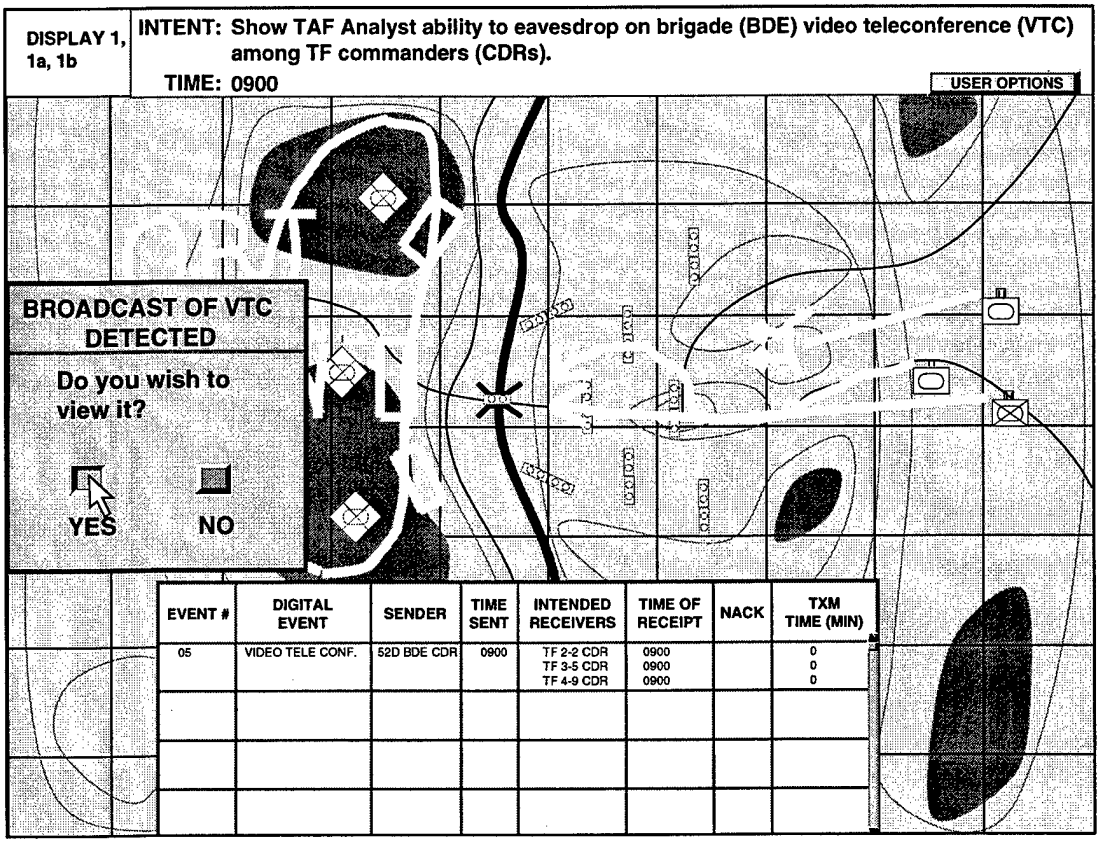
Italics - represents analyst-entered data

"Quotes" - represents names of dialog boxes

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TAF Analyst ability to eavesdrop on brigade (BDE) video teleconference (VTC) among TF commanders.

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
ShowMe tool with warning order overlay.	**DISPLAY 1 :** *Plan View.* Show what the TF commanders are seeing and listen to what the TF commanders are hearing. TRIGGER. In set-up, user selected to filter VTCs, operations orders (OPORDs), warning orders (WOs) and any jamming.		**X**	**X**	**DISPLAY 1a :** *Digital Message Log.* Shows each filtered message type and unit selected by operator as it is transmitted and keeps a running log of the messages until the user changes the message filter selection. TRIGGER. When the system senses a filtered message, it enters the message information into the Digital Message Log. **DISPLAY 1b.** *Dialog Box.* The "BROADCAST OF VTC DETECTED" dialog box appears. TRIGGER. The system detects the broadcast of a VTC.	**X**		



TAF ANALYST/WORKSTATION ACTIONS. Before the exercise, the Training Analyst directed the TAF workstation to filter digital traffic based on BLUFOR tactical nets he wished to monitor, i.e., Bn command net, Bn operations and intelligence net. As the system detects digital messages on the selected nets, the TAF workstation enters pertinent information concerning the communications in the Digital Message Log appearing in the lower portion of the display. The Analyst may view the content of digital communications by using his mouse and clicking on the **Event #**. Before the exercise, the Analyst also directed the TAF workstation to notify him immediately of specific types of digital traffic through trainer alert displays. In this case, the Analyst designated trainer alerts for video teleconferences (VTCs), operations orders (OPORDs), warning orders (WOs) and directed the system to notify him of any jamming of BLUFOR communications. In the above display, the TAF workstation alerts the Analyst to a BDE VTC. NOTE: Since this is a conference, all addressees received the message at the same time. Also, since it is continuous, the system increments the time of receipt and transmission time until the conference is over, retaining the last increment in both columns.

SCENARIO. The Bn TFs are receiving the BDE WO via video teleconference. The BDE commander (CDR) decides to use the ShowMe tool available on MCS to disseminate the information. This feature has the following capabilities:

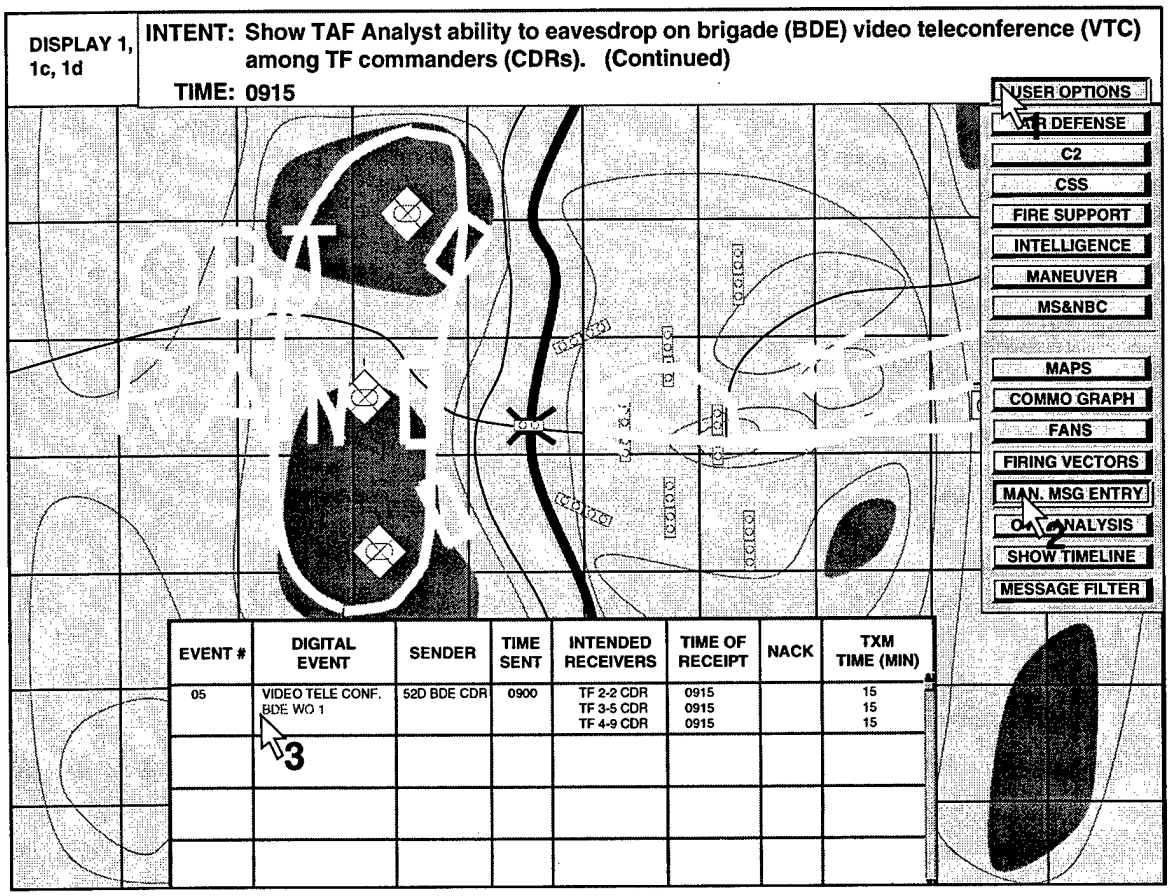
- Multipoint, multi-user, real-time conference communications
- Half or duplex conferencing
- Audio communications using microphone and speakers
- Shared whiteboard for graphs, spreadsheets, drawings, and snapshots
- Video conferencing (using cameras)
- Shared application tool (shares files from their parent application)

The user can conduct two types of conferences, one-way, and multi-participant.

C4I PERFORMANCE ASSESSMENT

INTENT : Show TAF Analyst ability to eavesdrop on brigade (BDE) video teleconference (VTC) among TF commanders. (CONTINUED)

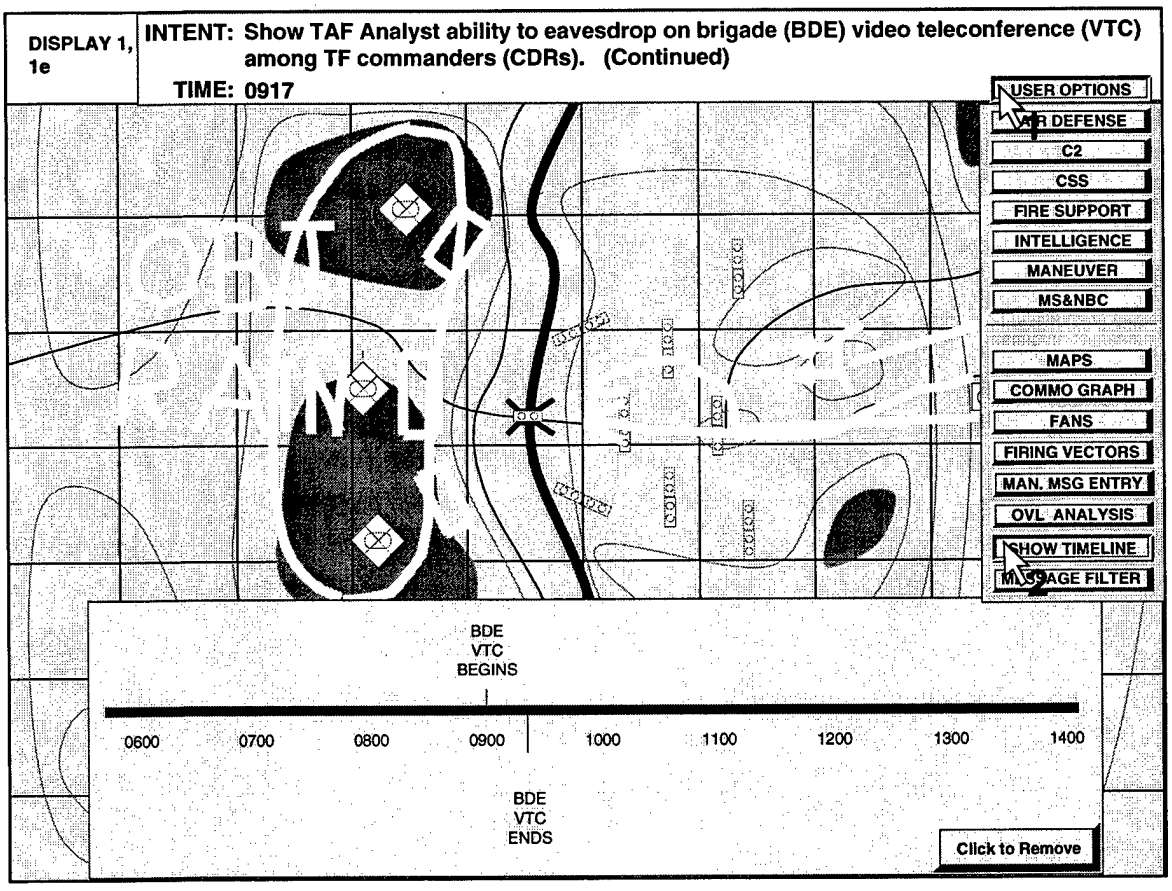
MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
ShowMe tool with WO overlay.	**DISPLAY 1 :** *Plan View.* Show what the TF commanders are seeing and listen to what the TF commanders are hearing.	X	X		**DISPLAY 1c :** *Pull-Down Menu.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. User selects **USER OPTIONS** to reveal his options. **DISPLAY 1d :** *User Entry.* The user manually enters information into the Digital Message Log. TRIGGER. User selects **MAN. MSG ENTRY** from "USER OPTIONS".	X		



TAF ANALYST/WORKSTATION ACTIONS. The workstation does not "know" that the VTC was the BDE CDR giving a WO. The Analyst wants to track when the BDE WO occurred to insure the unit is adhering to MTP standards. To make the WO annotation, the Analyst selects **USER OPTIONS**, **MAN. MSG ENTRY**, then adds *BDE WO1* in the Digital Message Log.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TAF Analyst ability to eavesdrop on VTC among TF commanders. (CONTINUED)								
MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
ShowMe tool with warning order overlay.	**DISPLAY 1 :** *Plan View.* Show what the TF commanders are seeing and listen to what the TF commanders are hearing.	X	X		**DISPLAY 1e :** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with mission training plan (MTP) standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. When the user clicks **SHOW TIMELINE** from the "USER OPTIONS" pull-down, the timeline (consisting of filtered messages from the selected unit) up to that point, will appear until the user clicks **Click to Remove**.		X	



TAF ANALYST/WORKSTATION ACTIONS. In order to ensure the system recorded the VTC on the timeline and to track the decision making process, the Analyst selects **USER OPTIONS**, **SHOW**

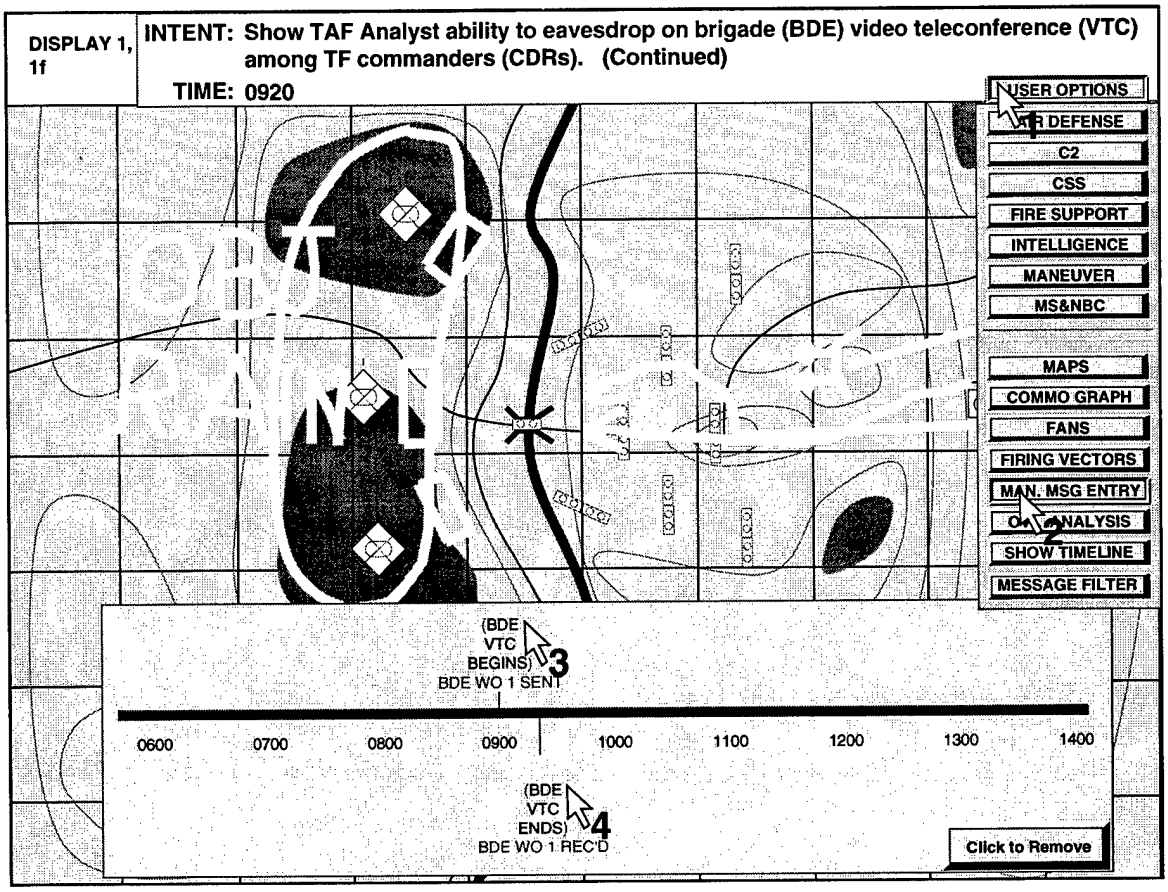
TIMELINE to see the entries on the timeline. The Analyst notes the workstation automatically entered the VTC event, however, the workstation does not indicate what the subject was.

SCENARIO. (Extract from the BDE CDR's WO brief to his Bn TF CDRs - we will focus on Bn TF 2-2 actions in the remainder of the scenario.) "Gents, our mission is to seize Objective RAIN. The attack begins at 090300ZSEP98. Prep of the objective must mask our movement to and through the obstacles. Bn TF 3-5 is the Support Force. Bn TF 2-2 is the Breach Force and Bn TF 4-9 is the Assault Force. Breaching assets from the Assault Force will be attached to Bn TF 2-2. You can see the templated obstacles. We have tasked a unmanned aerial vehicle (UAV) to fly over the area to look for actual obstacle positions. Bn TF 2-2 scouts will also give us a better idea of where the obstacles are. Special Operations Forces (SOF) will insure all obstacles are cleared from the bridge. They will be out of the area before our assault begins. Bn TF 3-5 take up SBF positions to suppress enemy direct fires covering obstacles while Bn TF 2-2 breaches those obstacles." "Once obstacles have been cleared, Bn TF 4-9 will attack the center of Objective RAIN, seizing the key terrain on the western side of the Green River. Bn TF 3-5 is to attack the enemy unit in the south of the objective. Bn TF 2-2 attacks the enemy unit to the north of Objective RAIN."

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TAF Analyst ability to eavesdrop on VTC among TF commanders. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
ShowMe tool with warning order overlay.	**DISPLAY 1 :** *Plan View.* Show what the TF commanders are seeing and listen to what the TF commanders are hearing.	X	X		**DISPLAY 1f :** *User Entry.* The user manually enters information into the Timeline. TRIGGER. User selects **MAN. MSG ENTRY** from "USER OPTIONS" pull-down.		X	



TAF ANALYST/WORKSTATION ACTIONS. When building the timeline, the workstation does not "know" the content of the VTC, only the time period in which it occurred. To allow the system to keep track of message traffic and apply MTP time standards, the Analyst selects **USER OPTIONS**, **MAN. MSG ENTRY** and goes to the timeline, manually entering *BDE WO 1 SENT* and *BDE WO 1 REC'D* in the proper location. The Analyst puts the original entries, BDE VTC BEGINS and BDE VTC ENDS in parenthesis so the workstation only looks at the WO entry. The workstation can now compare sent/received times for WO MTP time standards.

C4I PERFORMANCE ASSESSMENT MATRIX

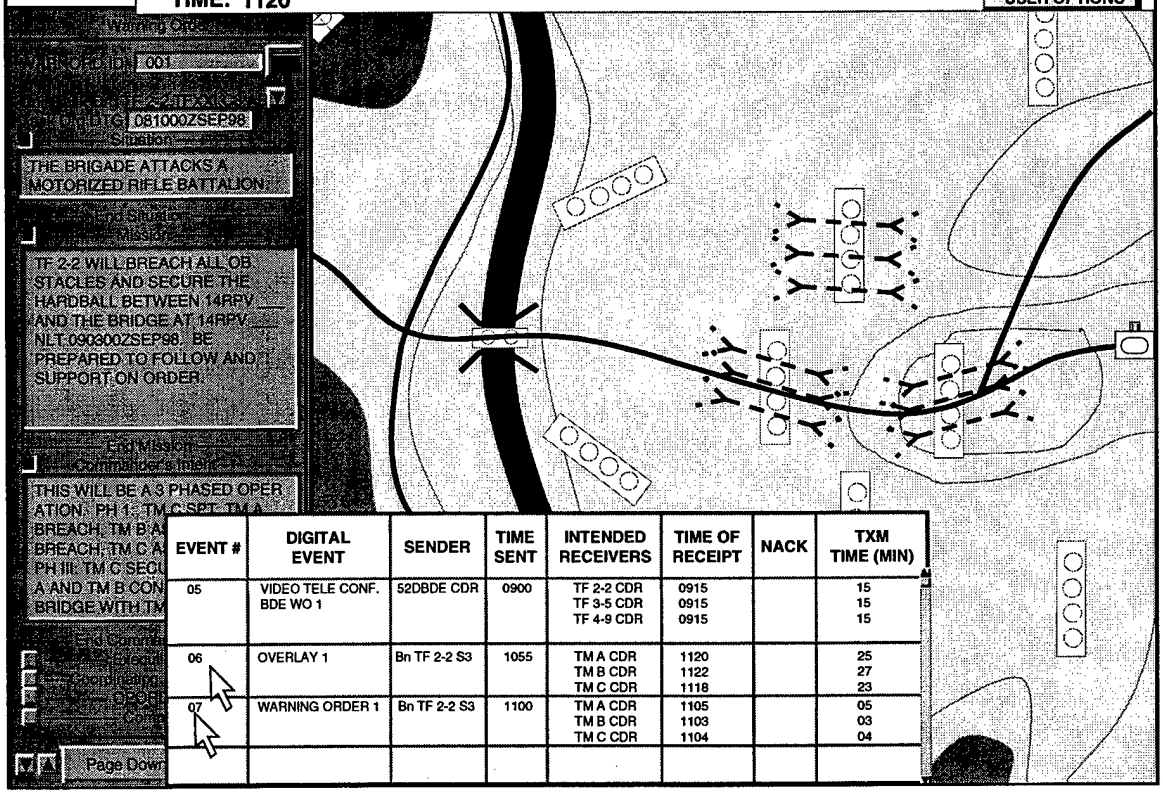
INTENT : Show TAF Analyst actions to check MTP standards on transmission/receipt of WOs.

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF obstacle overlay and BN/TF WO. TRIGGER. User clicks on "EVENT #" 06 and 07 in Digital Message Log to cause the BN/TF obstacle overlay and BN/TF WO to appear.	**DISPLAY 2 :** *Plan View.* Show perceived truth overlaid with the BN/TF obstacle overlay and BN/TF WO.		**X**		**DISPLAY 2a :** *Digital Message Log.* Shows each filtered message type and unit selected by operator as it is transmitted and keeps a running log of the messages until the user changes the message filter selection. TRIGGER. When the system senses a filtered message, it enters the message information into the Digital Message Log.	**X**		

DISPLAY 2, 2a

INTENT: Show TAF Analyst actions to check MTP standards on transmission/receipt of WOs.

TIME: 1120



EVENT #	DIGITAL EVENT	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	TXM TIME (MIN)
05	VIDEO TELE CONF. BDE WO 1	52DBDE CDR	0900	TF 2-2 CDR TF 3-5 CDR TF 4-9 CDR	0915 0915 0915		15 15 15
06	OVERLAY 1	Bn TF 2-2 S3	1055	TM A CDR TM B CDR TM C CDR	1120 1122 1118		25 27 23
07	WARNING ORDER 1	Bn TF 2-2 S3	1100	TM A CDR TM B CDR TM C CDR	1105 1103 1104		05 03 04

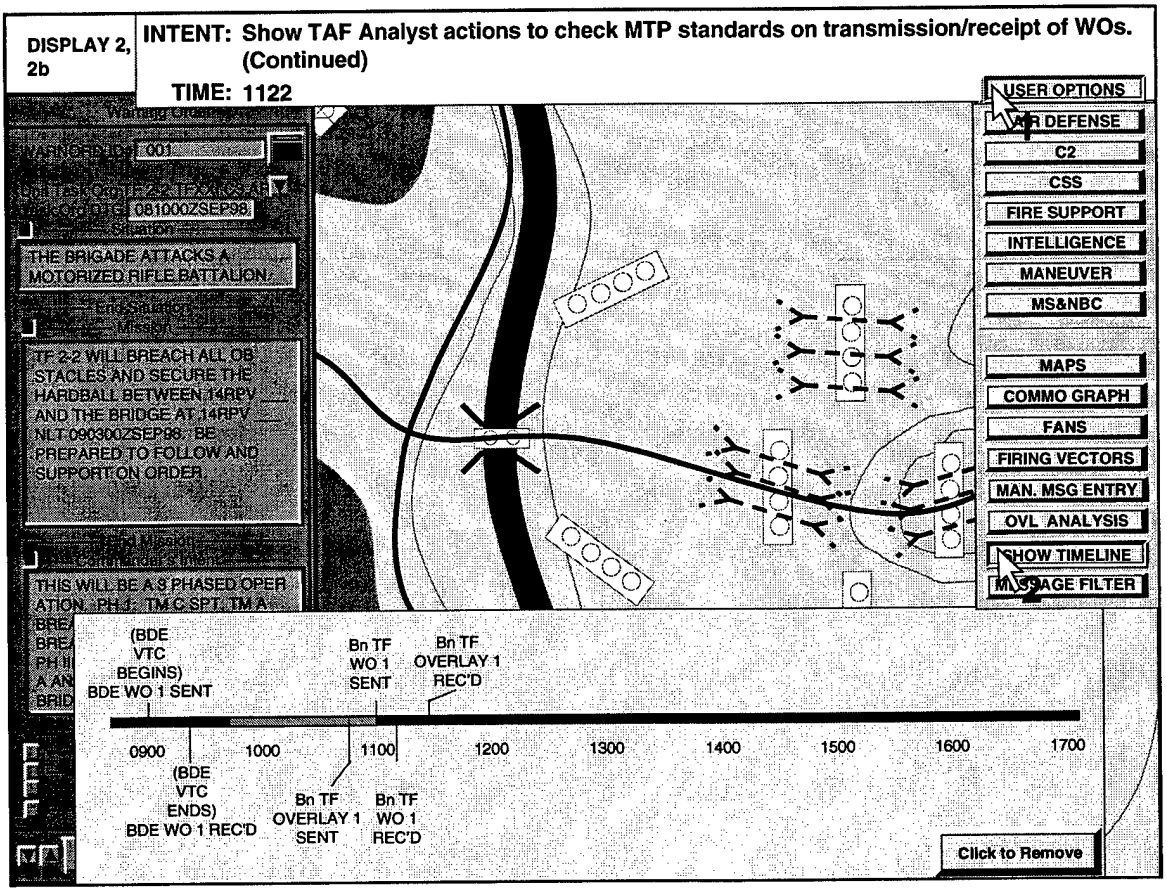
SCENARIO. Bn TF 2-2 continues to plan for its breaching operation and sends the obstacle overlay and WO 1 to its Co Tm CDRs. After looking at the obstacle locations, the Bn TF CDR decides to breach the obstacles along the road. He also realizes he must breach the obstacle just north - between the two road obstacles to allow Bn TF 3-5 a straight route to the bridge after the other two Bn TFs have crossed the bridge. Bn TF 2-2 CDR knows he has enough breaching assets to accomplish his mission.

TAF ANALYST/WORKSTATION ACTIONS. The Analyst notices that Bn TF 2-2 sent an overlay and a WO and decides to compare the contents with the BDE CDR's WO given two hours before. The Analyst clicks on **EVENT # 06** to view the Bn TF obstacle overlay and on **EVENT # 07** Bn TF WO 1 to view the WO.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TAF Analyst actions to check MTP standards on transmission/receipt of WOs. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF obstacle overlay and BN/TF WO. TRIGGER. User clicks on "EVENT #" 06 and 07 in Digital Message Log to cause the BN/TF obstacle overlay and BN/TF WO to appear.	**DISPLAY 2 :** *Plan View.* Show perceived truth overlaid with the BN/TF obstacle overlay and BN/TF WO.		**X**		**DISPLAY 2b :** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with MTP standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. When the user clicks **SHOW TIMELINE** from the "USER OPTIONS" pull-down, the timeline (consisting of filtered messages from the selected unit) up to that point, will appear until the user clicks **Click to Remove**.		**X**	**X**



TAF ANALYST/WORKSTATION ACTIONS. The Analyst notes the long timelag between when BDE WO 1 was received and when the Bn TF WO 1 was sent. He decides to display the timeline to find out if Bn TF 2-2 met the MTP time standards. The Analyst selects **USER OPTIONS**, **SHOW TIMELINE** to show the timeline. The Analyst notes the hashed line beginning at the BDE WO 1 REC'D mark and ending 15 minutes later. He also notes the solid line beginning at the end of the hashed line and running to the Bn TF WO 1 SENT entry. The Analyst estimates the Bn TF busted the MTP time standard by about 1 hour and 15 minutes, based on the length of the solid line. NOTE: The workstation automatically applies MTP time standards to events that do not require Analyst intervention. When Analyst intervention is necessary, the system prompts the Analyst and given the choice of whether or not he wants the workstation to perform the analysis.

SCENARIO. Bn TF 2-2 continues to refine the plan and begins putting together the OPORD.

DISCUSSION POINTS FOR AAR DISPLAY 2

WHAT HAPPENED:(Trainer Entry)

The Bn TF sent WO 1 to CoTms 1 1/2 hours after receiving it from BDE.

FACILITATING QUESTIONS (WHY IT HAPPENED)(System Entry)

1. Were there problems understanding the BDE WO?

2. Was the creation of theBn TF WO delayed due to a key member not being present?

3. Was the delay due to creating the overlay?

4. Did this delay create problems at the Co Tm level?

HOW TO IMPROVE:(System Entry)

The digitizedBn TF receives the mission in the form of an MCS WO. Upon receipt of the order, the commander and staff exchange information and conduct a preliminary METT-T analysis to gather pertinent information for the WO. WOs should be as timely and complete as possible; always include available graphics; include most current timeline; and include updated enemy information.

The Bn TF must issue a complete WO within 15 minutes of receipt of the brigade order.

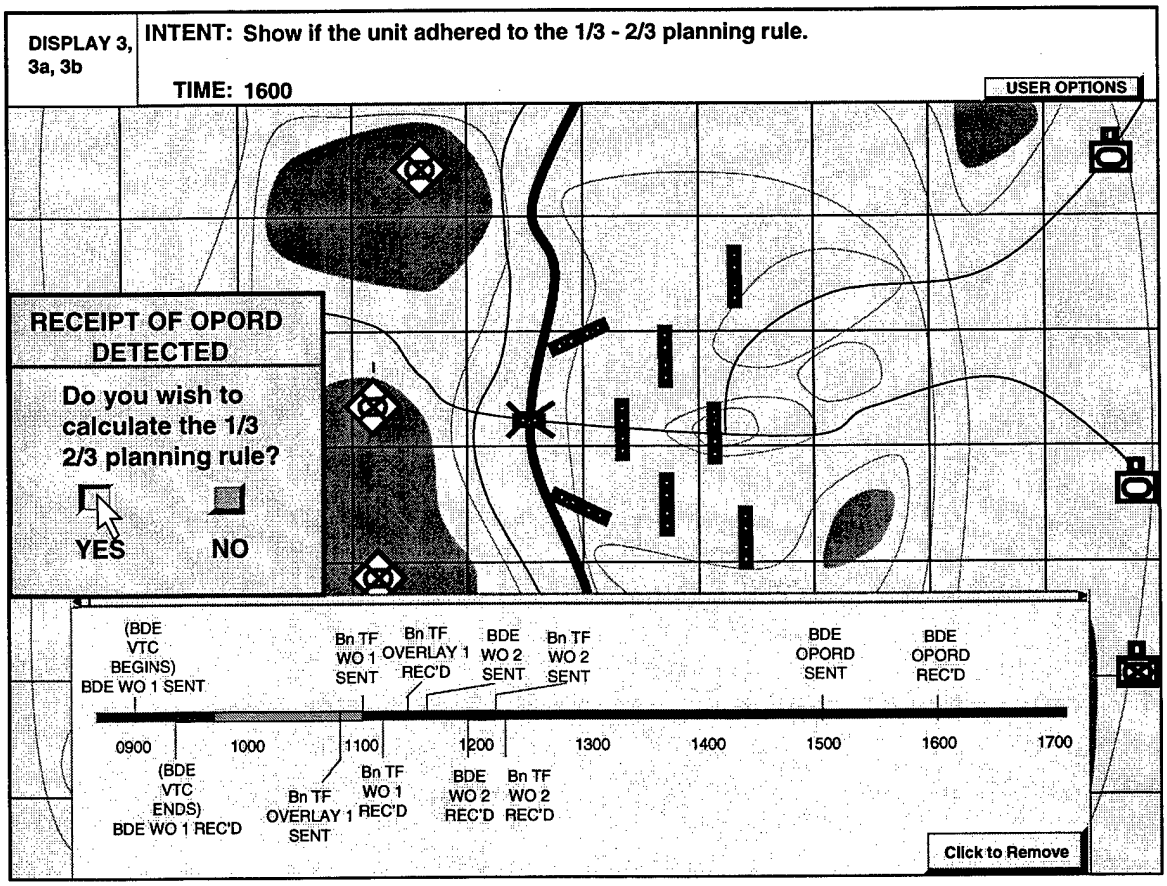
Reference: FKSM 17-2-1 (EXFOR), FKSM 71-2-1 (EXFOR)-MTP

TAF ANALYST/WORKSTATION ACTIONS. When the system logs the BDE WO (after the Analyst manually enters that the WO was sent and received in the VTC) receipt, the system begins to count-down 15 minutes. The system begins drawing a hashed line beginning at the BDE receipt time. It continues the countdown until the Bn TF sends its WO. If the Bn TF busts the 15 minute window, the system automatically causes the hashed line to change to solid line at that point. The solid line continues until the Bn TF sends its WO. When the system detects the Bn TF WO, it ends the line. At the same time the solid line begins, the system begins a search of its database to find "Facilitating Questions" and "How To Improve" statements, along with references pertaining to the 15 minute time constraint. The system places the information in memory until the Bn TF sends its WO. Once the Bn TF sends the WO, the system creates the AAR aid.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show if the unit adhered to the 1/3 - 2/3 planning rule.

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 3 :** *Plan View.* Show ground truth of BDE area of operation.				**DISPLAY 3a :** *Dialog Box.* Provides user capability to calculate the 1/3 - 2/3 planning rule. TRIGGER. System detects BDE OPORD received and displays the dialog box. **DISPLAY 3b :** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with MTP standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. When the user clicks **SHOW TIMELINE** from "USER OPTIONS" pull-down, the timeline (consisting of filtered messages from the selected unit) up to that point, will appear until the user clicks **Click to Remove**.			

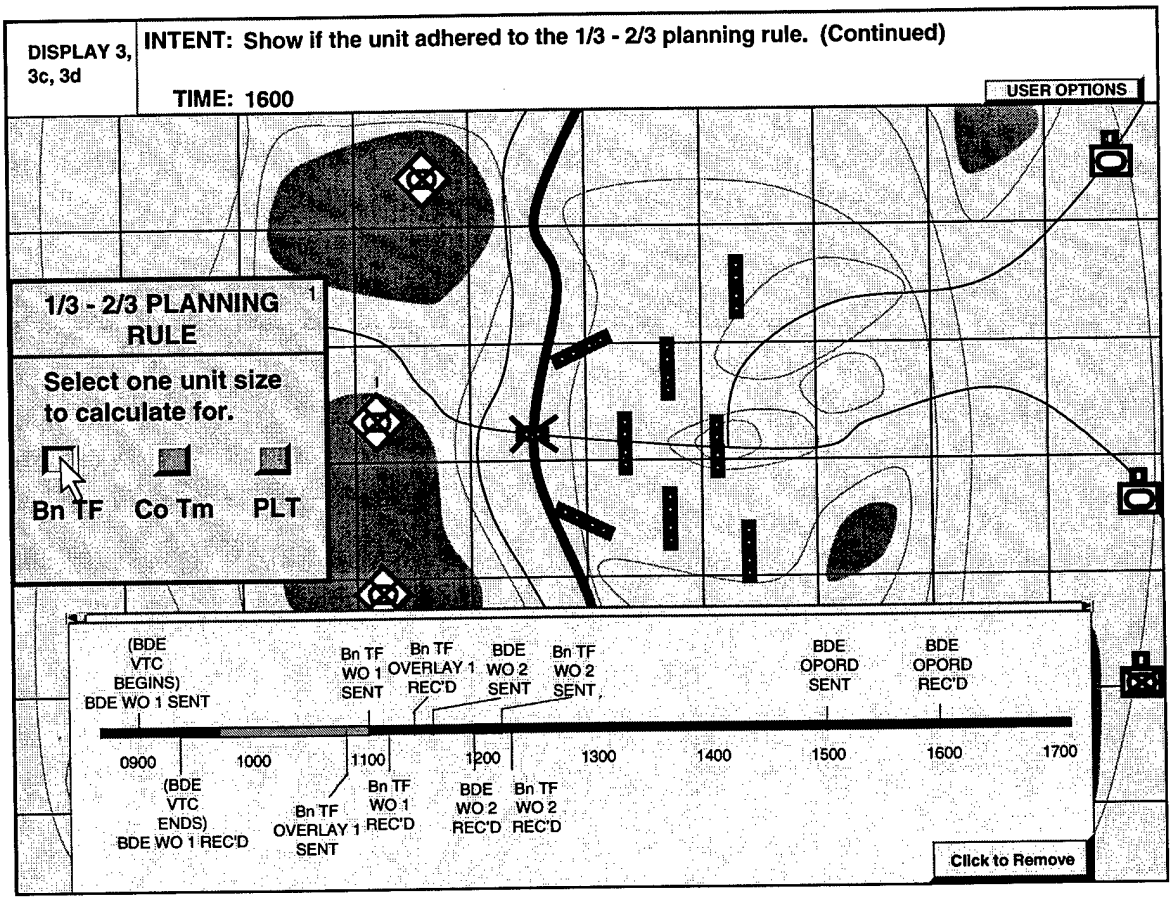


SCENARIO. Bn TF 2-2 receives the BDE OPORD and begins to compare it with the plans it has already been formulating based on the WOs received from the BDE.

TAF ANALYST/WORKSTATION ACTIONS. The system prompts the Analyst once it senses receipt of the BDE OPORD and asks the Analyst if he wants to have the 1/3 - 2/3 planning rule calculated. Since Bn TF 2-2 has already busted an MTP time standard, the Analyst decides to calculate the time when the Bn TF must send its OPORD to its Co Tms. The Analyst selects **YES** to cause the system to begin the sequence for 1/3 - 2/3 calculations. NOTE: Previously, the workstation has applied MTP time standards automatically to digital events that did not require Analyst intervention. Since the 1/3 - 2/3 planning rule requires the Analyst to provide information, the Analyst is given the option of whether or not to have the workstation perform the analysis.

INTENT : Show how the unit is observing the 1/3 - 2/3 planning rule. (CONTINUED)

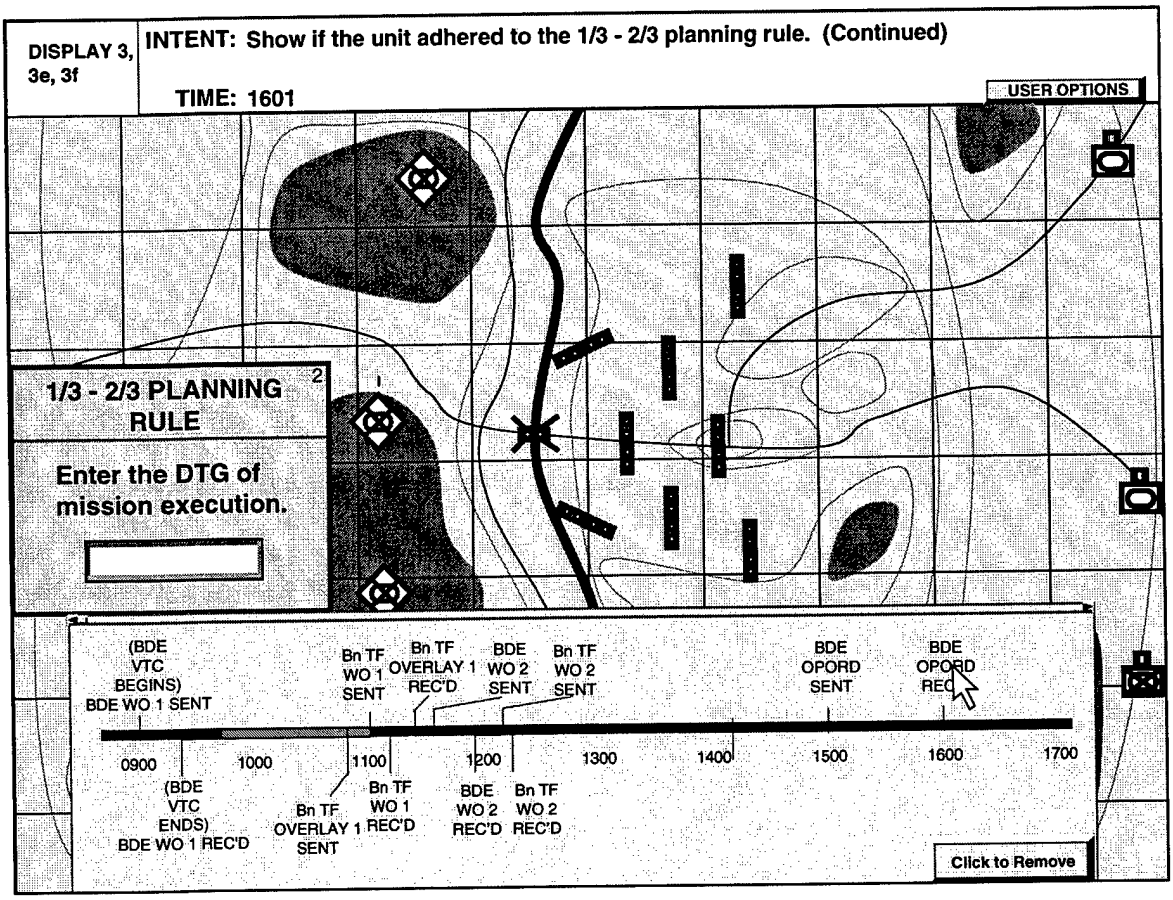
MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 3 :** *Plan View.* Show ground truth of BDE area of operation.		X		**DISPLAY 3c :** *Dialog Box.* Provides user the capability to pick which unit level he wishes to calculate for. TRIGGER. User answers **YES** to 1/3 - 2/3 dialog box. **DISPLAY 3d:** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with MTP standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. The user clicks **SHOW TIMELINE** from "USER OPTIONS" pull-down; the timeline (consisting of filtered messages from the selected unit) up to that point, will show until he clicks **Click to Remove**		X	



TAF ANALYST/WORKSTATION ACTIONS. Since Bn TF 2-2 will be the next command to create an OPORD to send to its subordinate units, the Analyst selects **Bn TF**.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show how the unit is observing the 1/3 - 2/3 planning rule. (CONTINUED)								
MCS DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
NONE.	**DISPLAY 3 :** *Plan View.* Show ground truth of BDE area of operation.		**X**		**DISPLAY 3e :** *Dialog Box.* User must enter the DTG of mission execution. TRIGGER. System detects the user's answer to unit echelon in previous dialog box. **DISPLAY 3f :** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with MTP standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. When the user clicks **SHOW TIMELINE** from "USER OPTIONS" pull-down, the timeline (consisting of filtered messages from the selected unit) up to that point, will appear until the user clicks **Click to Remove.**		**X**	

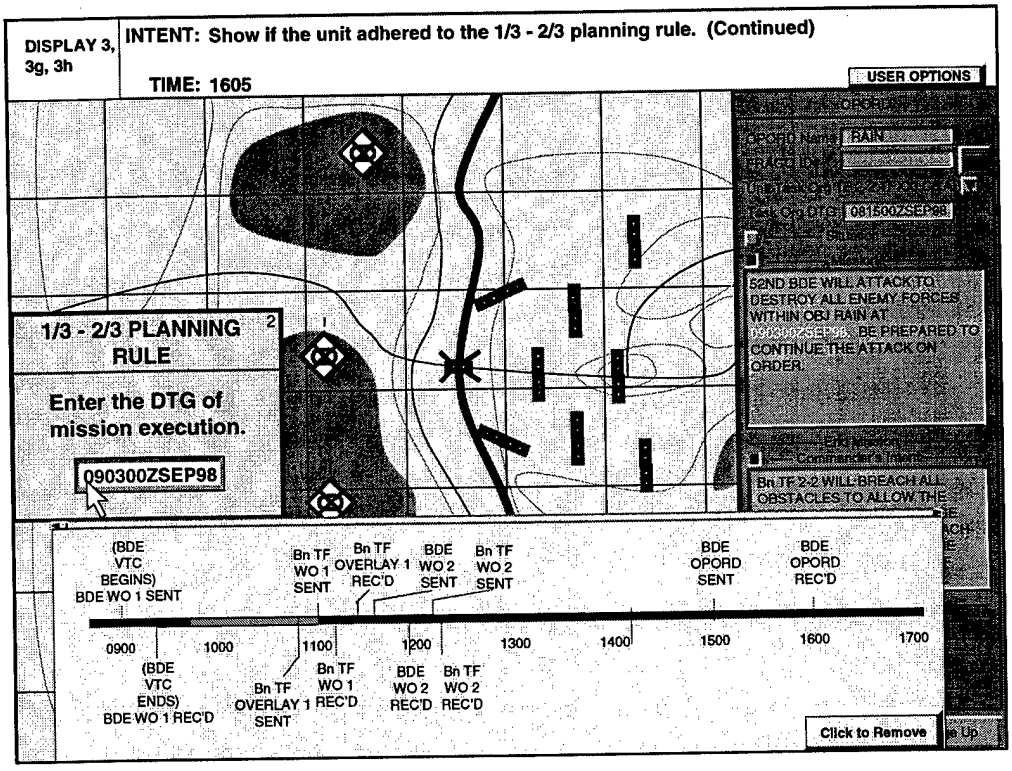


TAF ANALYST/WORKSTATION ACTIONS. The system prompts the Analyst to enter the DTG of mission execution. The Analyst realizes he must find this information. He knows he can either review Bn TF 2-2 WO 1 or he can review the BDE OPORD. Since the BDE OPORD has the most recent timetable for the attack, he decides to review it. The Analyst selects **BDE OPORD REC'D** on the timeline to cause the BDE OPORD to appear.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show how the unit is observing the 1/3 - 2/3 planning rule. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
The BDE OPORD. TRIGGER. The user clicks on the BDE OPORD REC'D message on the Timeline.	**DISPLAY 3 :** *Plan View.* Show ground truth of BDE area of operation.		**X**		**DISPLAY 3g :** *Dialog Box.* User must enter the DTG of mission execution. TRIGGER. System detects the user's answer to previous dialog box and displays this dialog box. **DISPLAY 3h :** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with MTP standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. When the user clicks **SHOW TIMELINE** from the "USER OPTIONS" pull-down, the timeline (consisting of filtered messages from the selected unit) up to that point, will appear.		**X**	



TAF ANALYST/WORKSTATION ACTIONS. The system displays the BDE OPORD and the Analyst finds the DTG of mission execution in the MISSION statement portion of the OPORD. The Analyst takes this DTG and types it into the space in the prompt.

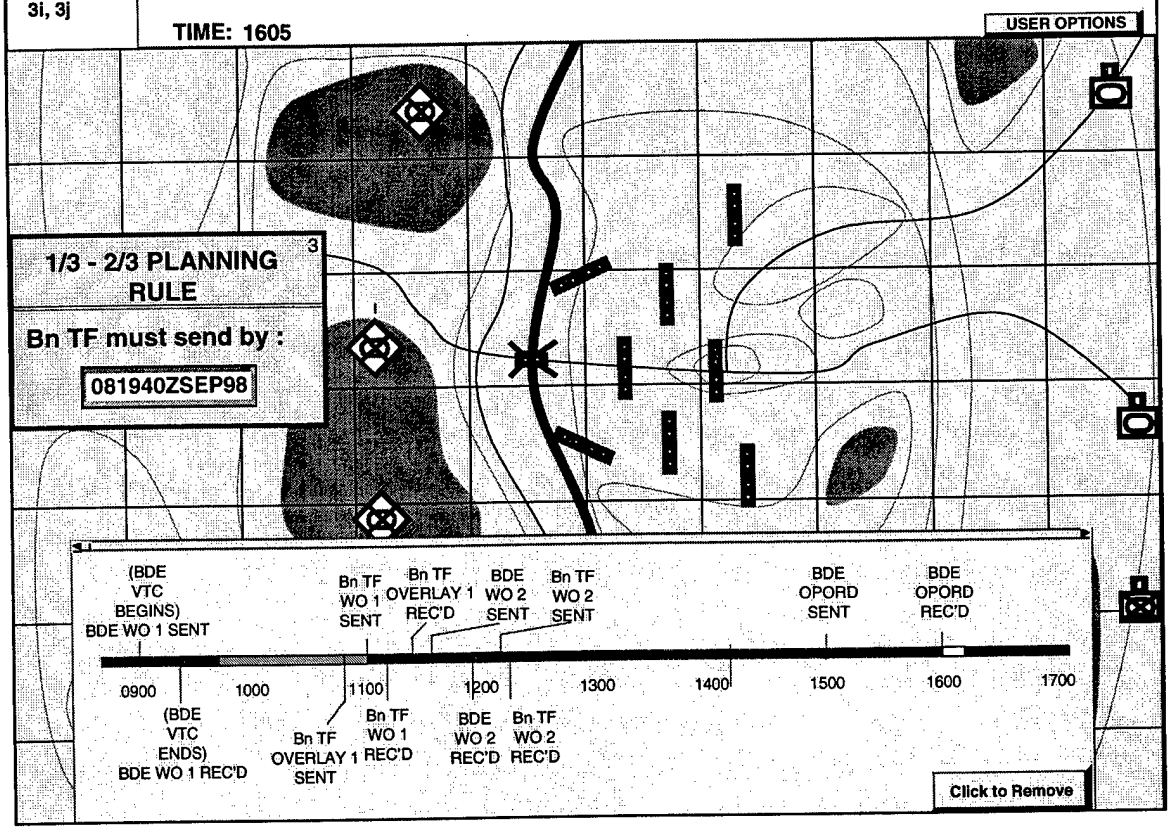
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show how the unit is observing the 1/3 - 2/3 planning rule. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 3 :** *Plan View.* Show ground truth of BDE area of operation.		X		**DISPLAY 3i :** *Dialog Box.* Provides user calculation of DTG - when unit must send the message. TRIGGER. User enters mission execution DTG in previous dialog box. He obtains entry information from the OPORD Mission statement. **DISPLAY 3j :** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with MTP standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. When the user clicks **SHOW TIMELINE** from "USER OPTIONS" pull-down, the timeline (consisting of filtered messages from the selected unit) up to that point, will appear until the user clicks **Click to Remove**.		X	X

DISPLAY 3, 3i, 3j

INTENT: Show if the unit adhered to the 1/3 - 2/3 planning rule. (Continued)

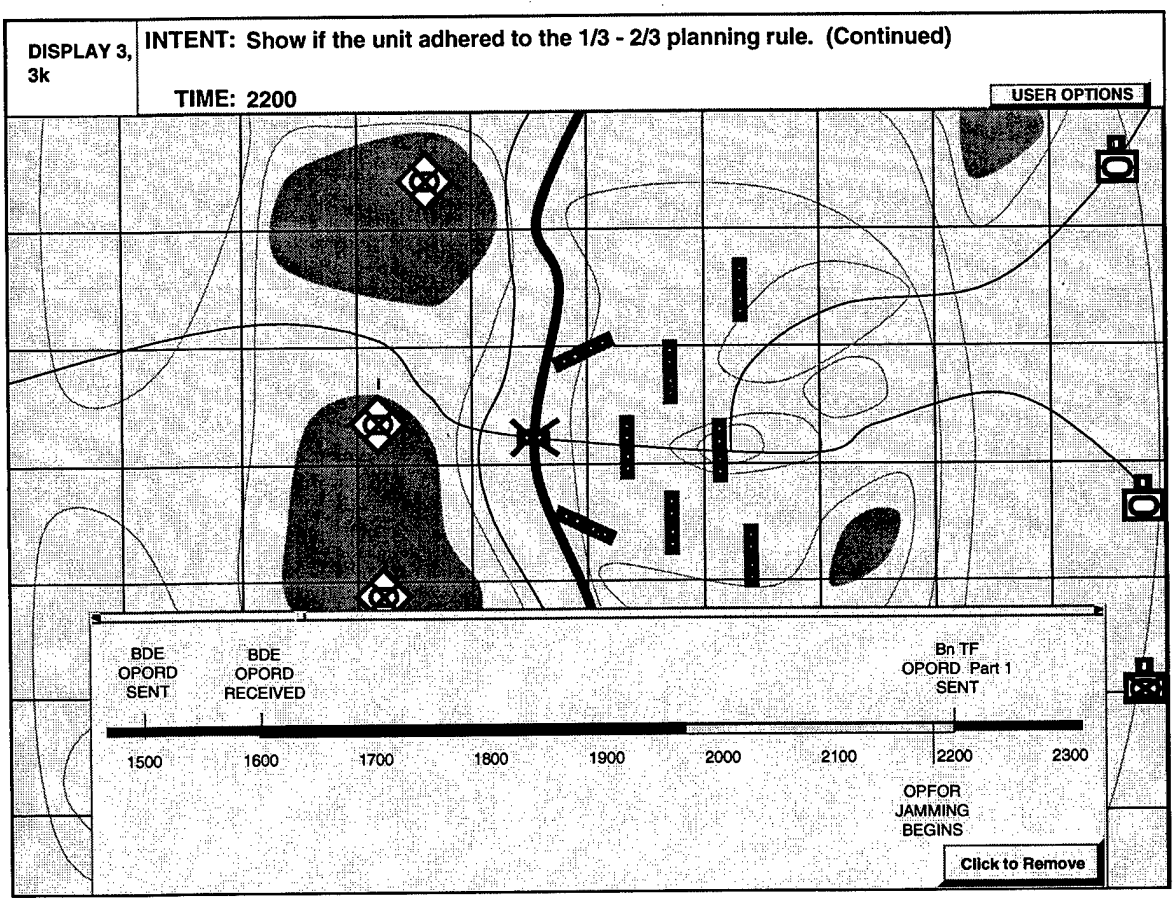


TAF ANALYST/WORKSTATION ACTIONS. The workstation takes the BDE OPORD receipt time and subtracts it from the mission execution time to give the total time remaining. The system then divides the time available by 1/3 and adds the quotient to the BDE OPORD time of receipt, placing this DTG into the "Bn TF must send by" box. The system also applies this information to the timeline, causing a hash mark to begin at BDE OPORD REC'D time. This hash mark will increment until the Bn TF exceeds the Bn TF must-send-by time. Once the Bn TF exceeds the time, the system causes the hashed line to change to a solid line, denoting Bn TF 2-2 violated the 1/3 - 2/3 planning rule.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show how the unit is observing the 1/3 - 2/3 planning rule. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 3 :** *Plan View.* Show ground truth of BDE area of operation.		**X**		**DISPLAY 3k :** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with MTP standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. When the user clicks **SHOW TIMELINE** from "USER OPTIONS" pull-down, the timeline (consisting of filtered messages from the selected unit) up to that point, will appear until the user clicks **Click to Remove**.		**X**	**X**



TAF ANALYST/WORKSTATION ACTIONS. At 1940 the system stops creating the hashed line and begins a solid line, showing Bn TF 2-2 violated the 1/3 - 2/3 planning rule. At 2155 the system detects OPFOR jamming beginning and automatically places the event on the timeline. At 2200 the system detects the Bn TF OPORD, Part 1 being sent. The Analyst looks at the solid line and estimates that the the Bn TF exceeded the 1/3 - 2/3 planning rule by 2 hours and 20 minutes. The Analyst wants to track when the Co Tms receive the OPORD since jamming has started and there are only 5 hours remaining before the mission begins.

DISCUSSION POINTS FOR AAR DISPLAY 3

WHAT HAPPENED:(Trainer Entry)

Bn TF exceeded 1/3 - 2/3 planning rule by 2 hours 20 minutes.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. Were there problems understanding the BDE OPORD?

2. Was the creation of the Bn TF OPORD delayed due to a key member not being present?

3. Was the delay due to creating the overlay?

4. Was there a problem gathering information for the OPORD?

5. Were the embedded systems used to facilitate the creation of the OPORD? (OCOKA, weapon fans, etc.)

6. Did this delay create problems at the Co Tm level?

HOW TO IMPROVE:(System Entry)

Digitization streamlines the process of planning by providing simultaneous and near real-time distribution of combat information at most steps in the planning process. The TF commander does not gain an advantage over the enemy simply by using automated equipment. He achieves the advantage by using the information to position the soldiers and killing systems at the decisive point or points on the battlefield in a timely manner.

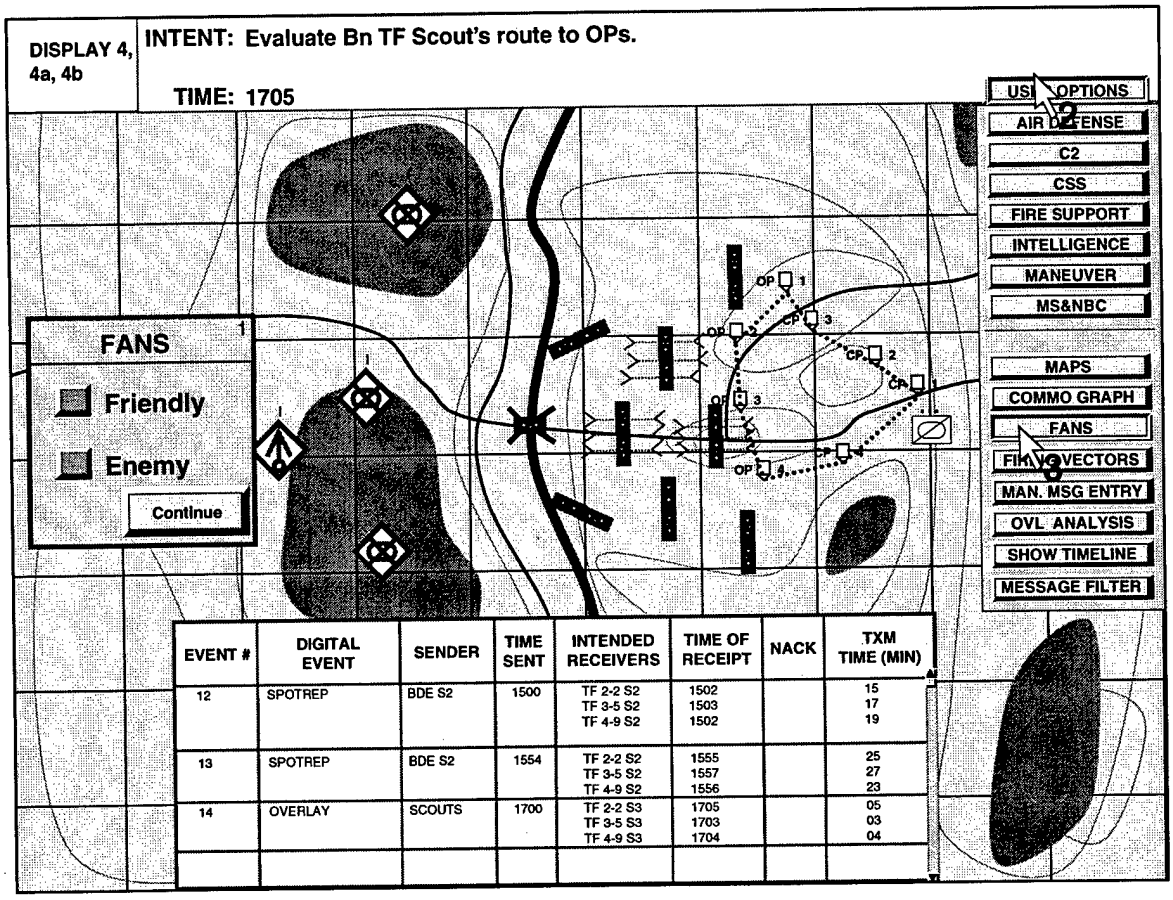
The higher headquarters issues OPORD IAW one-third, two-thirds rule, and makes full use of available time.

Reference: FKSM 17-2-1 (EXFOR), FKSM 71-2-1 (EXFOR)-MTP

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Evaluate BN/TF Scout's route to OPs.

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Scout's operations overlay.	**DISPLAY 4 :** *Plan View.* Show Scout operations overlay over ground truth of BDE area of operation. TRIGGER. User clicks on "EVENT #" box next to the overlay entry in the Digital Message Log.		**X**		**DISPLAY 4a :** *Pull-Down Menu.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. User selects **USER OPTIONS** to reveal his options. **DISPLAY 4b :** *Dialog Box.* The "FANS 1" dialog box appears. TRIGGER. User selects **FANS** from "USER OPTIONS" pull-down.		**X**	



SCENARIO. The Scouts complete their planning and issue their overlay. They are putting the final touches on their OPORD.

TAF ANALYST/WORKSTATION ACTIONS. The workstation detects the Scout overlay and enters it into the Digital Message Log. The Analyst decides to see where the scouts will be operating and examine their planned routes and observation points (OPs). The Analyst causes the system to display the overlay over ground truth by clicking on **EVENT # 14**. To check the route and OPs, the Analyst decides to display OPFOR observation and weapons coverage. The Analyst selects **USER OPTIONS**, revealing options on the pull-down menu. He then selects **FANS** from the pull-down. This selection causes the workstation to display the box "FANS [1]."

C4I PERFORMANCE ASSESSMENT MATRIX

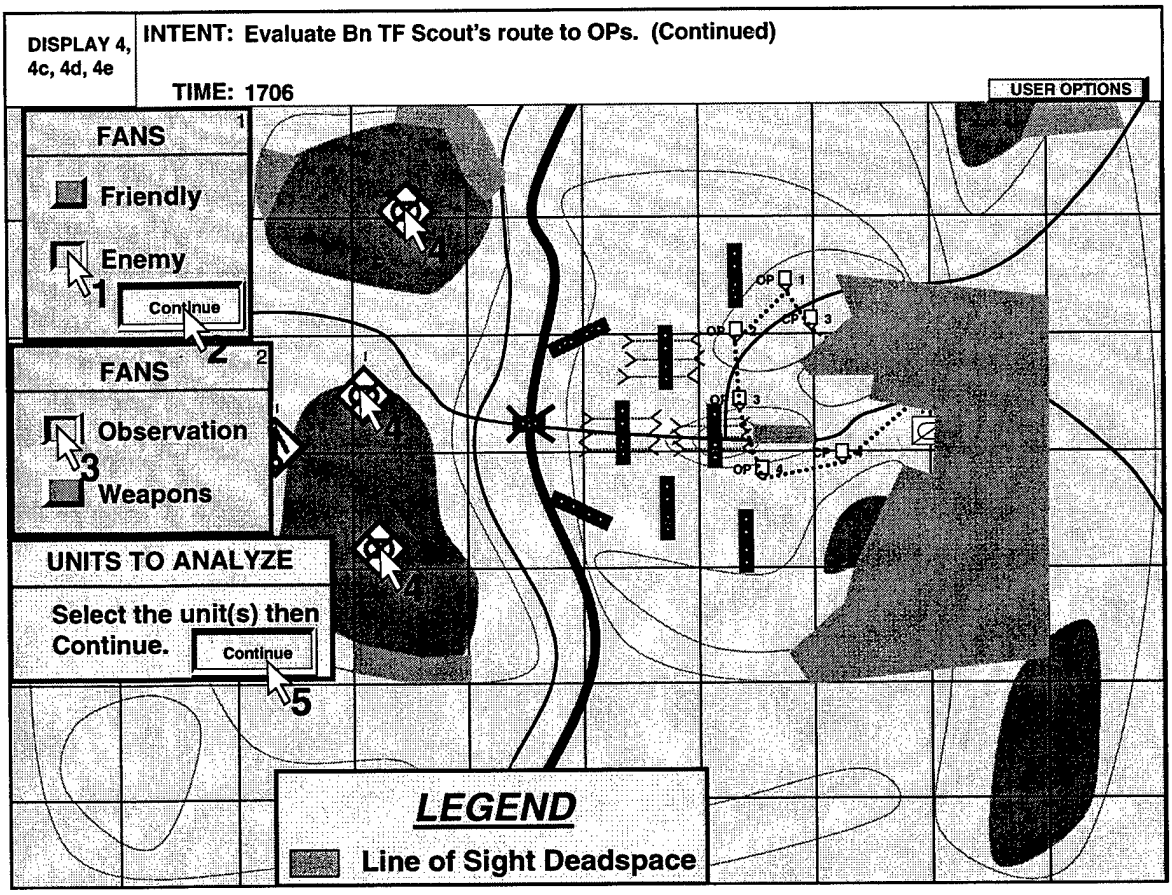
INTENT : Evaluate BN/TF Scout's route to OPs. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Scout's operations overlay.	**DISPLAY 4 :** *Plan View.* Show Scout operations overlay over ground truth of BDE area of operation.		**X**		**DISPLAY 4c :** *Dialog Box.* The "FANS 2" dialog box appears. TRIGGER. User selects entry from "FANS 1" dialog box. **DISPLAY 4d :** *System Overlay.* The system detects areas that are unobservable to the enemy and shades these areas a gray color. TRIGGER. User selects **Observation** from the "FANS 2" dialog box.		**X**	

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Evaluate BN/TF Scout's route to OPs. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Scout's operations overlay.	**DISPLAY 4 :** *Plan View.* Show Scout operations overlay over ground truth of BDE area of operation.		**X**		**DISPLAY 4e :** *Legend.* The system creates a legend for the System Overlay(s). TRIGGER. When the system annotates an overlay, it also creates a legend for the annotations.		**X**	

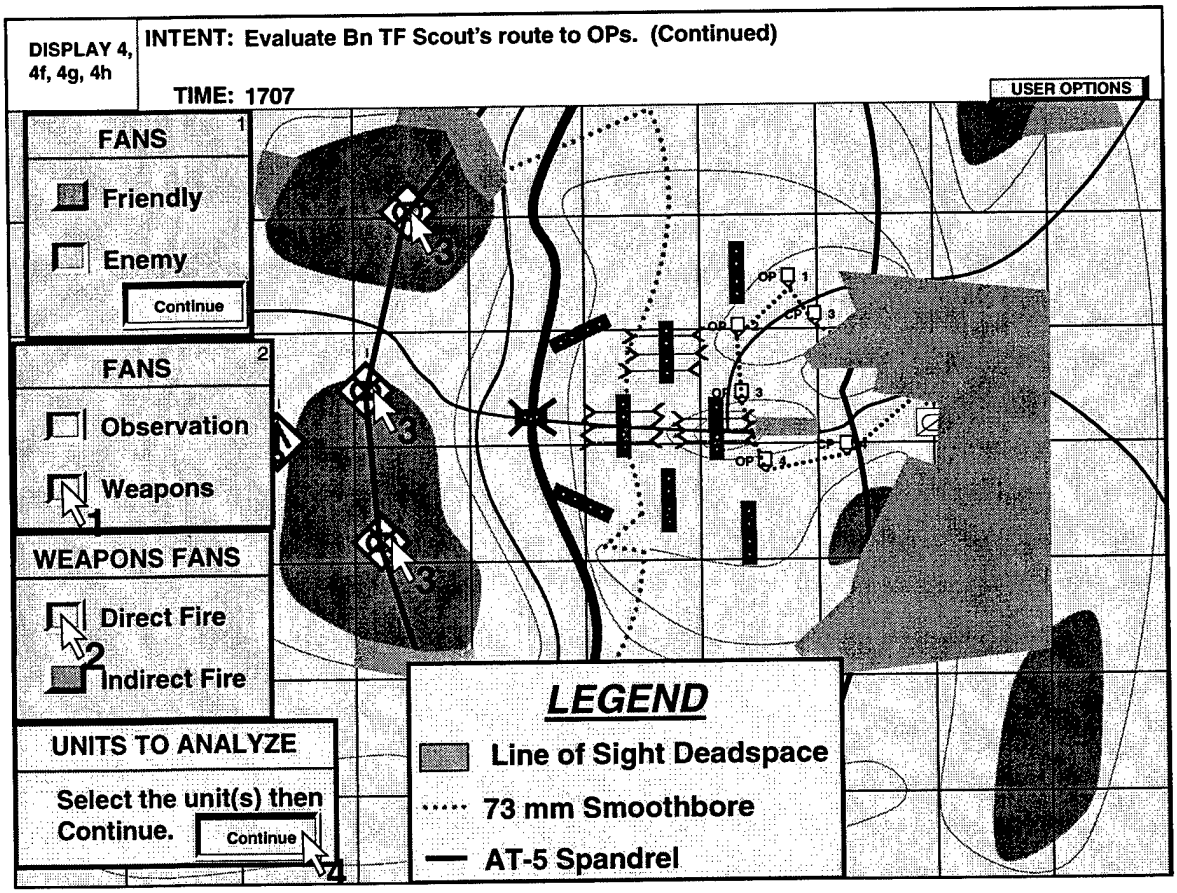


TAF ANALYST/WORKSTATION ACTIONS. The system displays the "FANS [1]" dialog box. After the Analyst selects **Enemy** and **Continue**, the system displays the "FANS [2]" dialog box. When the Analyst selects **Observation**, the dialog box directing the Analyst to select the units he wishes to analyze appears. Once he clicks on the units and then the **Continue** button, the system places light-gray areas over portions of the map, depicting areas unobservable by selected enemy units. The system creates a legend to explain the deadspace annotations made on the overlay.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Evaluate BN/TF Scout's route to OPs. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Scout's operations overlay.	**DISPLAY 4 :** *Plan View.* Show Scout operations overlay over ground truth of BDE area of operation.		X		**DISPLAY 4f :** *Dialog Box.* The "WEAPONS FANS" dialog box appears. TRIGGER. User selected entry from "FANS 2" dialog box. **DISPLAY 4g :** *Range Fans.* Graphically depicts ranges as a range fan. TRIGGER. When the user selects **Continue** after he selects **direct** or **indirect fire** and the unit(s) he wants to analyze. **DISPLAY 4h :** *Dialog Box.* The Legend for the fan(s) appears. TRIGGER. The system displays the Legend after it draws the fan(s).		X	



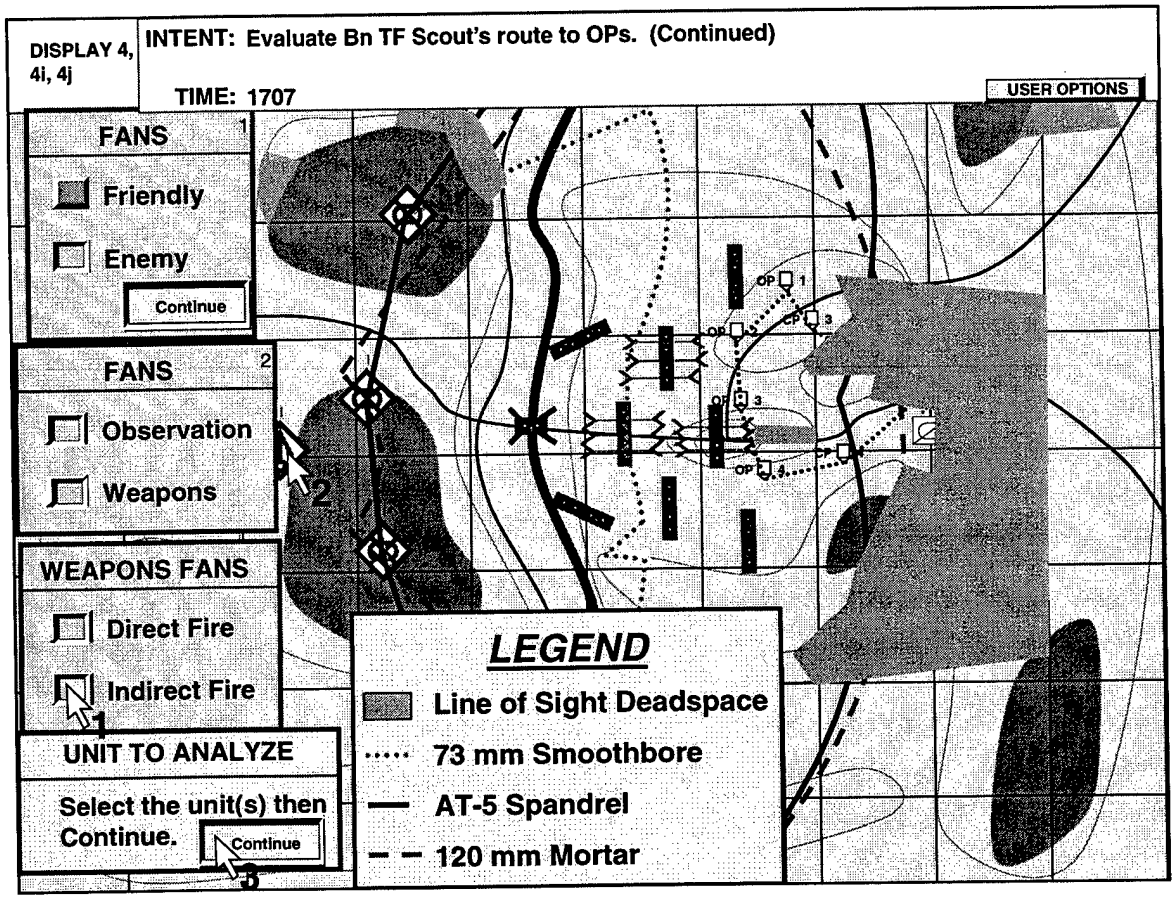
TAF ANALYST/WORKSTATION ACTIONS. The Analyst selects **Weapons** from the "FANS [2]" dialog box. The "WEAPONS FANS" dialog

box appears. The Analyst selects **Direct Fire** and then selects OPFOR units containing direct fire weapons. The Analyst then selects **Continue**, causing the system to draw direct fire fans for the direct fire weapon systems contained in the selected units and adds the new graphics to the legend.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Evaluate BN/TF Scout's route to OPs. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Scout's operations overlay.	**DISPLAY 4 :** *Plan View.* Show Scout operations overlay over ground truth of BDE area of operation.		X	X	**DISPLAY 4i :** *Range Fans.* Graphically depicts ranges as a range fan. TRIGGER. When the user selects **Continue** after he selects direct or indirect fire and the unit(s) he wants to analyze. **DISPLAY 4j :** *Dialog Box.* The Legend for the fans appears. TRIGGER. The system displays the Legend after it draws the fan(s).		X	X



TAF ANALYST/WORKSTATION ACTIONS. The Analyst selects **Indirect Fire** from the "WEAPONS FANS" dialog box. He then selects the unit containing indirect fire weapons. Once he has selected the unit(s), he clicks on **Continue**. The system draws the indirect fire fan for indirect fire weapon systems contained in the selected unit. The system then adds indirect fire systems to the legend.

DISCUSSION POINTS FOR AAR DISPLAY 4

WHAT HAPPENED:(Trainer Entry)

The scouts did not properly use terrain during their reconnaissance.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

How did the MCS terrain evaluation tool help you evaluate planned routes for the scouts susceptibility to enemy observation and fires?

HOW TO IMPROVE:(System Entry)

The commander may elect to conduct his initial reconnaissance process by using FBCB2, MCS, UAV and other digital reconnaissance tools. Reconnaissance reports may result in the modification of courses of action, allow for focusing on a single course of action or eliminate infeasible COAs, and can assist in confirming or denying the commander/staff initial assessments.

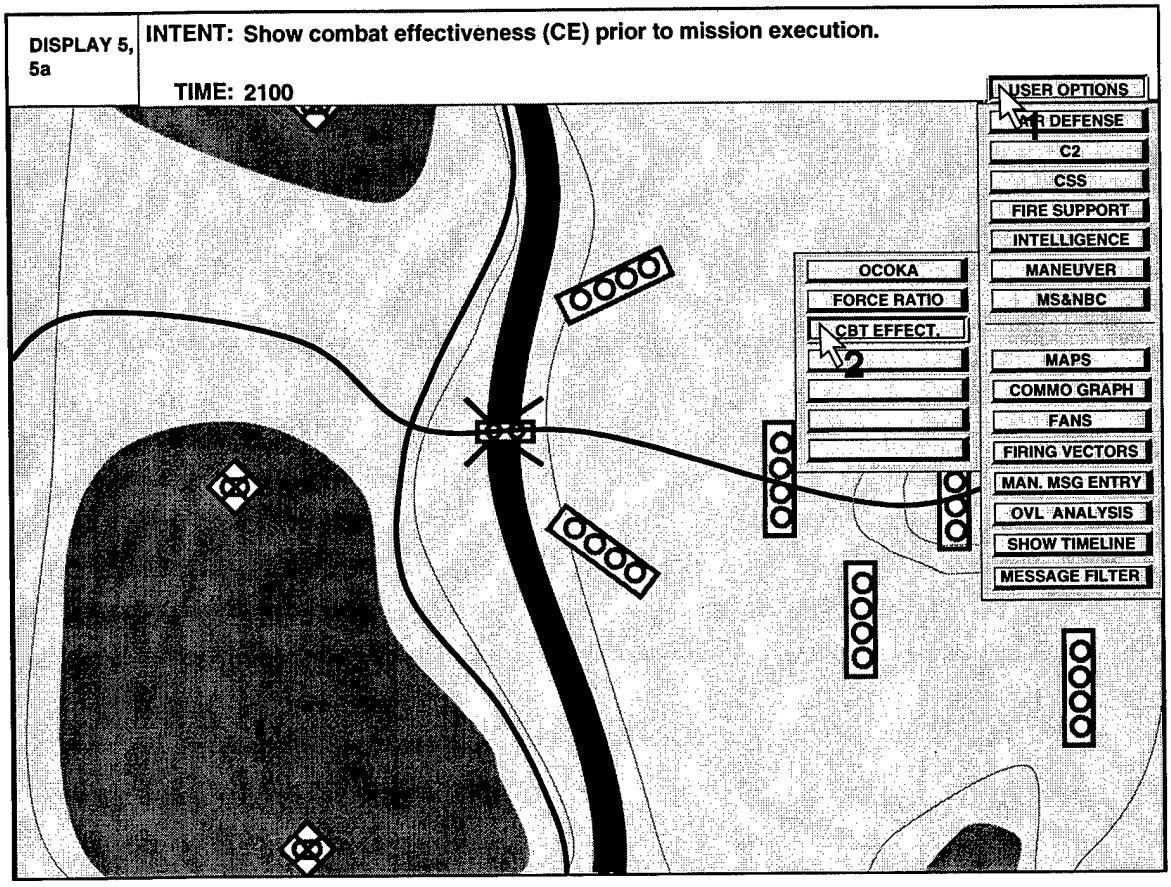
Use all digital systems at your disposal to enhance your ability to complete the mission with as few casualties as possible.

Reference: FKSM 71-2-1 (EXFOR)

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show combat effectiveness (CE) prior to mission execution.

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 5 :** *Plan View.* Show ground truth of BN/TF area of operation.		X		**DISPLAY 5a :** *Pull-Down Menu.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. User selects **USER OPTIONS** to reveal his options.		X	



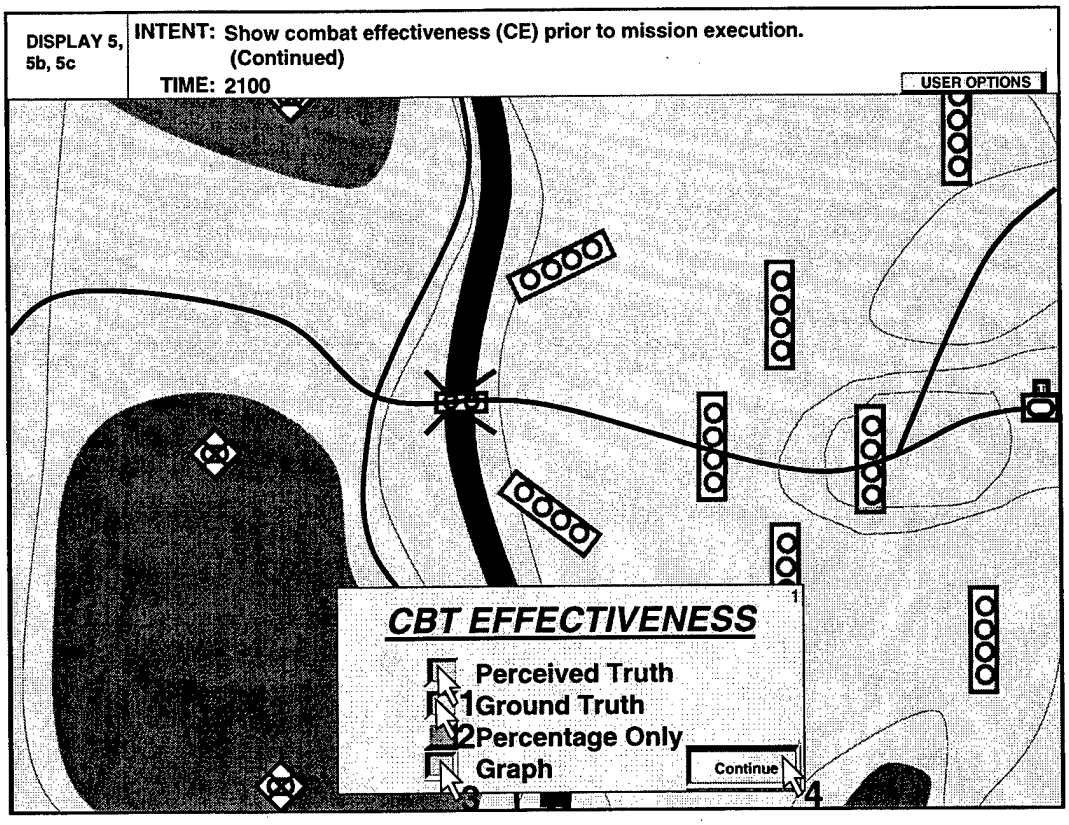
TAF ANALYST/WORKSTATION ACTIONS. As one of his routine tasks, the Analyst computes combat effectiveness for the unit he is observing. He conducts this analysis prior to the engagement to identify disconnects in perceived truth among the players on combat readiness. The analyst also uses the system to detect disparities between ground truth and perceived truth information on combat readiness. (NOTE: Ground truth is instrumentation or

OC-provided information on the actual or real situation. Perceived truth is what the players believe to be true [i.e., information contained in digital and voice reports]). Contrasting these truths may provide the analyst insights on the causes and effects that led to battle outcome. The Analyst selects **USER OPTIONS**, then **CBT EFFECT.**

SCENARIO. Bn TF 2-2 is continuing to plan and prepare for mission execution.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show combat effectiveness (CE) prior to mission execution. (CONTINUED)								
MCS DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
NONE.	**DISPLAY 5 :** *Plan View.* Show ground truth of BN/TF area of operation.		**X**		**DISPLAY 5b :** *Dialog Box.* "CBT EFFECTIVENESS 1" dialog box appears. TRIGGER. User selects **CBT EFFECT.** on the "USER OPTIONS" pull-down.		**X**	



TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **CBT EFFECT**, the system causes the "CBT EFFECTIVENESS [1]" dialog box to appear. The Analyst wants to display a graphical comparison of perceived truth and ground truth figures. The Analyst selects **Perceived Truth**, **Ground Truth**, and **Graph** from the dialog box. Finally, he selects **Continue**.

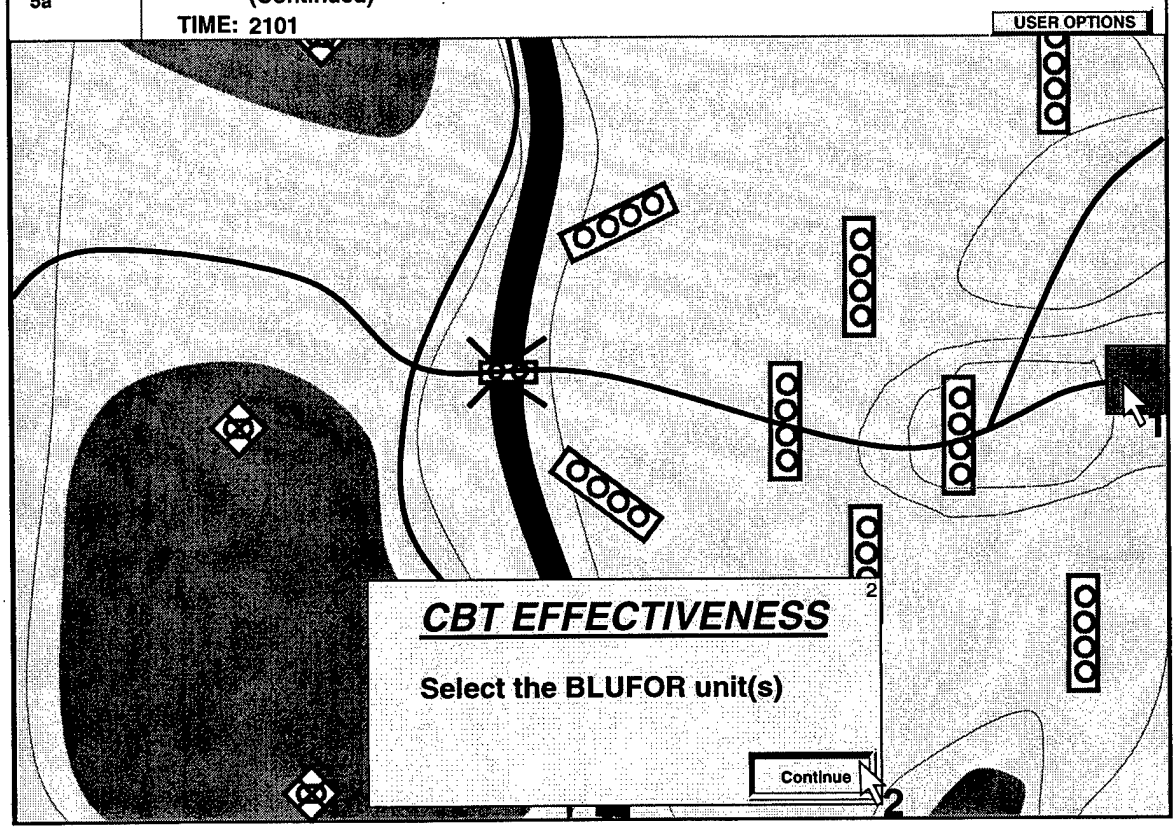
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show combat effectiveness (CE) prior to mission execution. (CONTINUED)								
MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 5:** *Plan View.* Show ground truth of BN/TF area of operation.		X		**DISPLAY 5c:** *Dialog Box.* The "CBT EFFECTIVENESS 2" dialog box appears. TRIGGER. User selects one or more options from the "CBT EFFECTIVENESS 1" dialog box and selects **Continue**.		X	

DISPLAY 5, 5a

INTENT: Show combat effectiveness (CE) prior to mission execution. (Continued)

TIME: 2101

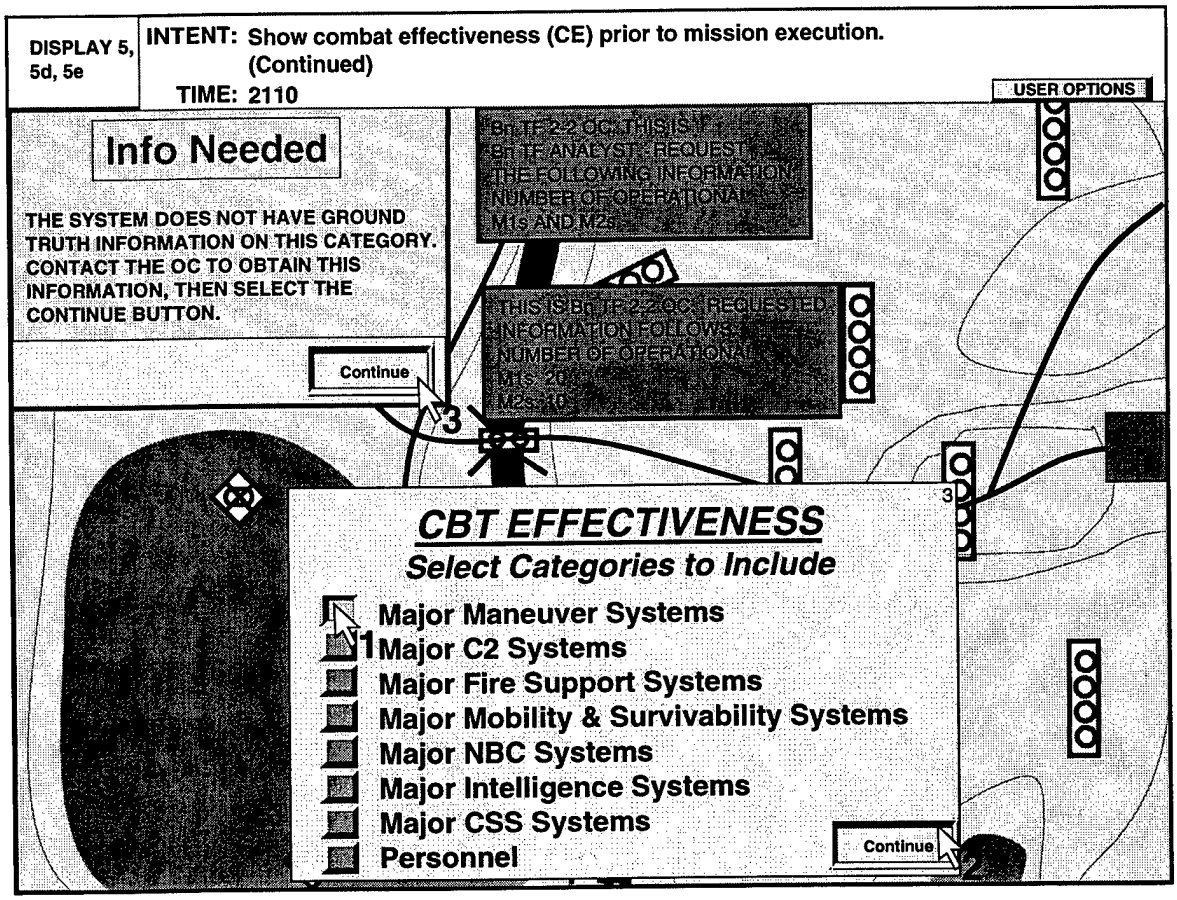


TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **Continue** on the "CBT EFFECTIVENESS [1]" dialog box, the "CBT EFFECTIVENESS [2]" message box appears, directing the Analyst to select BLUFOR unit(s). The Analyst selects the BLUFOR unit with his mouse, then selects **Continue**.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show combat effectiveness (CE) prior to mission execution. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 5 :** *Plan View.* Show ground truth of BN/TF area of operation.		X		**DISPLAY 5d :** *Dialog Box.* The "CBT EFFECTIVENESS 3" dialog box appears. TRIGGER. User selects the unit(s) to be evaluated and selects **Continue**. **DISPLAY 5e :** *Info Needed Box.* System alerts user that the workstation does not have needed information. The Info Needed Box tells the user what steps he must take to get the information. TRIGGER. User selected one or more categories of equipment to evaluate and selects **Continue**.	X	X	

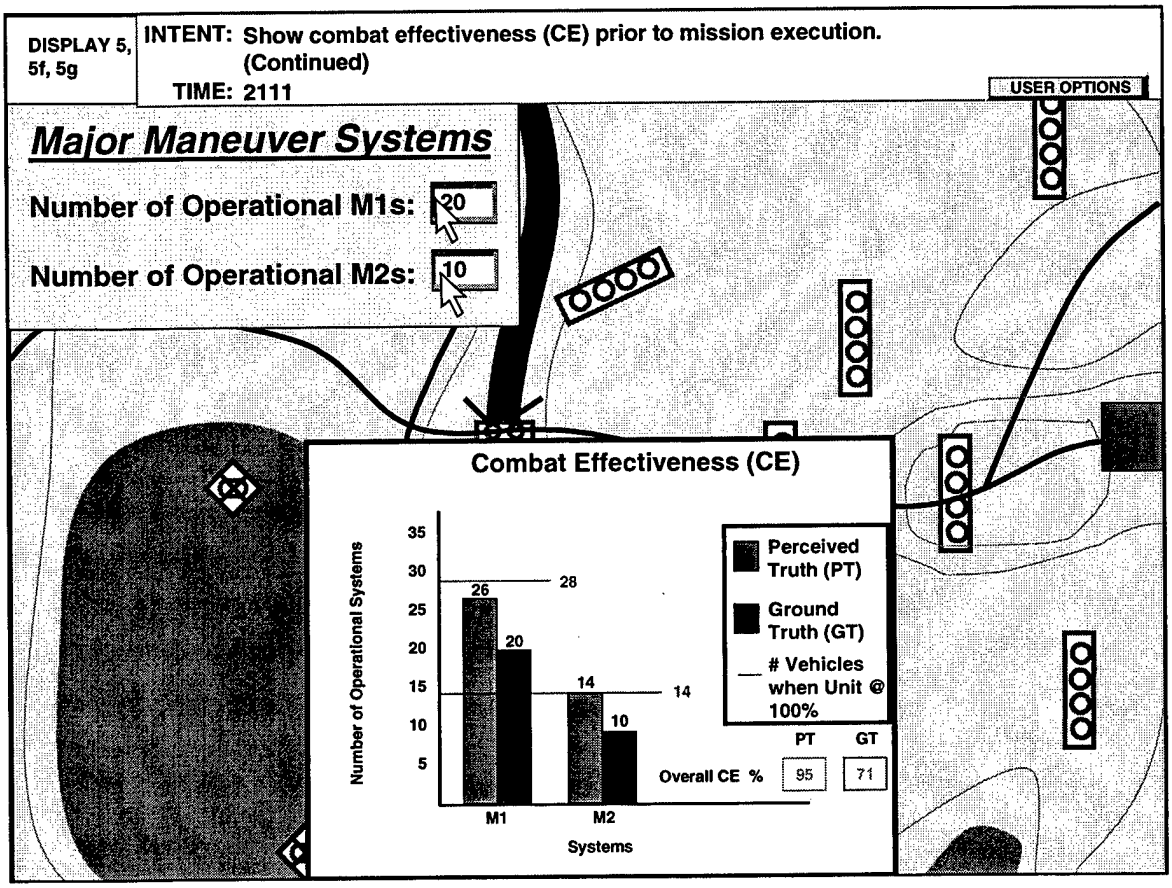


TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects the unit, the "CBT EFFECTIVENESS [3]" dialog box appears. The Analyst selects **Major Maneuver Systems**, then **Continue**. The system automatically displays an "Info Needed" message with instructions. Since the Analyst wants to graph ground truth information and the system does not have the information, it displays the "Info Needed" message. The Analyst contacts the OC and receives the needed information then selects **Continue**.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show combat effectiveness (CE) prior to mission execution. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 5 :** *Plan View.* Show ground truth of BN/TF area of operation.		**X**		**DISPLAY 5f :** *Dialog Box.* The system displays a box for the user to input the information the system needs to compute CE. TRIGGER. User selects **Continue** from the Info Needed Box. **DISPLAY 5g :** *Graph.* "Cbt Effectiveness" graph appears. TRIGGER. User inputs data system needs to compute CE.		**X**	**X**



TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **Continue** from the "Info Needed" dialog box, the "Major Maneuver Systems" dialog box appears. The Analyst enters the system numbers in the appropriate fields, then the system draws the CE graphs.

DISCUSSION POINTS FOR AAR DISPLAY 5

WHAT HAPPENED:(Trainer Entry)

There was a large discrepancy between ground truth combat effectiveness and perceived combat effectiveness.

FACILITATING QUESTIONS (WHY IT HAPPENED)(System Entry)

1. Did you perform a combat effectiveness analysis prior to issuing the OPORD?

2. How old was your CSS information?

3. From what source did you obtain your CSS information?

HOW TO IMPROVE:(System Entry)

When arraying friendly forces, a function of COA development, it is important to recognize that friendly-enemy planning ratios (combat power analysis) are unchanged by the fielding of digital units.

The S3 receives information from all staff officers to help him determine the status of friendly forces relative to the type of operation to be conducted. With the aid of the staff, the S3 projects the status (such as composition, disposition, strength, significant activities, and peculiarities and weaknesses) of the unit at the beginning of the operation.

You should use CSS information that is less than 20 minutes old. If your information is older, request updates.

Reference: FKSM 71-2-1 (EXFOR), FM 71-123

C4I PERFORMANCE ASSESSMENT MATRIX

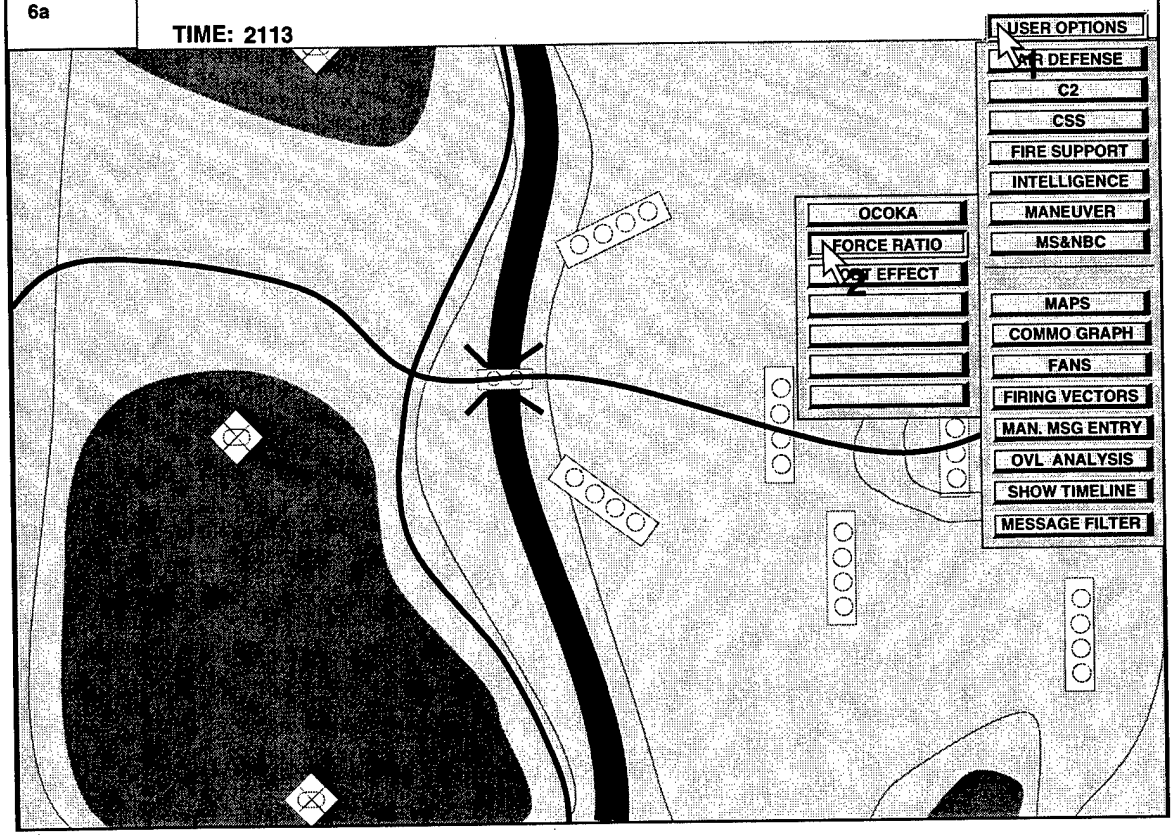
INTENT : Show perceived truth and ground truth force ratios prior to mission execution.

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 6 :** *Plan View.* Show perceived truth of BN/TF area of operation.		**X**		**DISPLAY 6a :** *Pull-Down Menu.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. User selects **USER OPTIONS** to reveal his options.		**X**	

DISPLAY 6, 6a

INTENT: Show perceived truth and ground truth force ratios prior to mission execution.

TIME: 2113

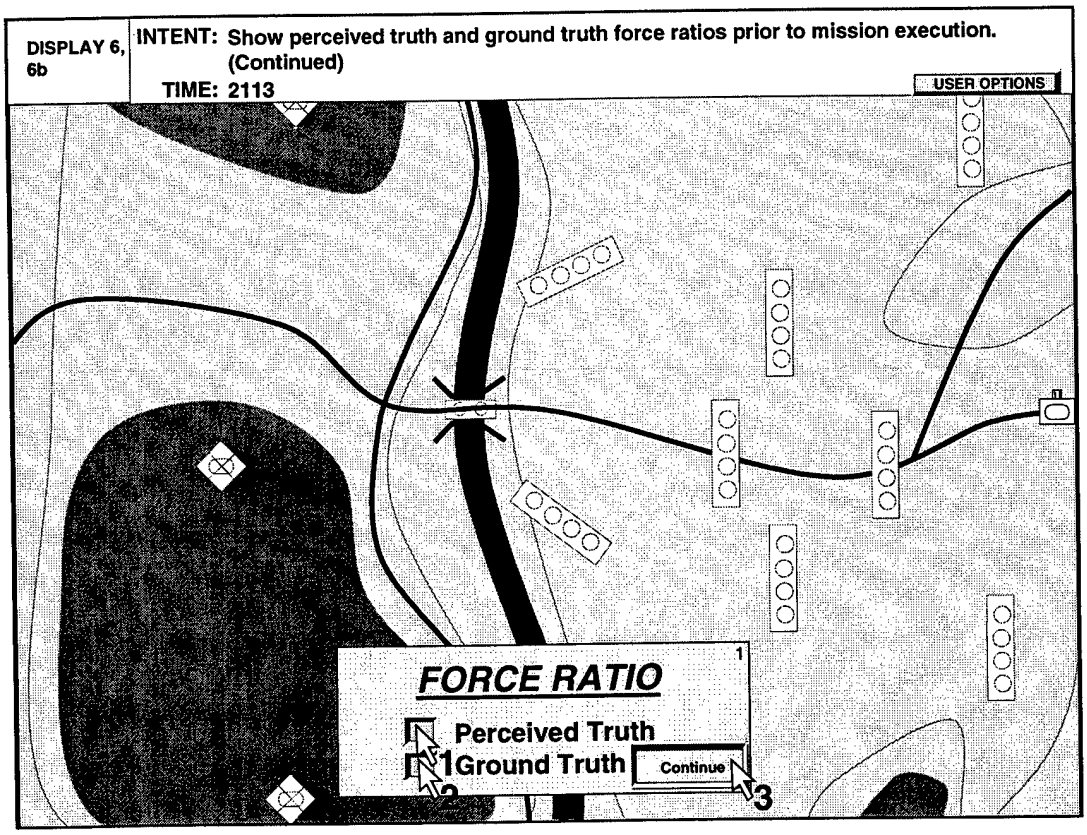


TAF ANALYST/WORKSTATION ACTIONS. The Analyst now wants to know the unit's force ratio of friendly to enemy combat systems. He realizes that missions have suggested force ratios (i.e., BLUFOR 3 : OPFOR 1 for an offensive mission) and he wants to see if the unit's force ratio meets the suggested ratio for the unit's assigned mission. He selects **USER OPTIONS**, then **FORCE RATIO.**

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show perceived truth and ground truth force ratios prior to mission execution. (CONTINUED)

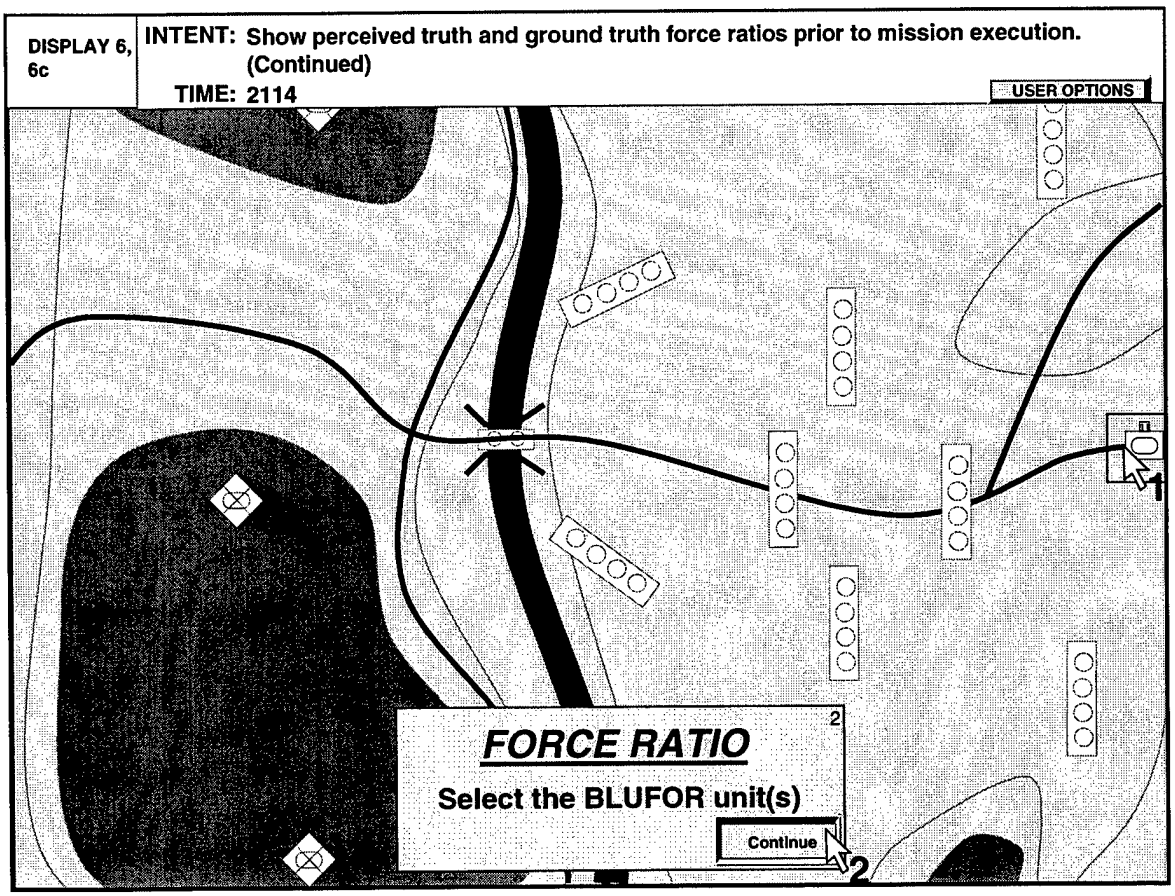
MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 6 :** *Plan View.* Show perceived truth of BN/TF area of operation.		X		**DISPLAY 6b :** *Dialog Box.* "FORCE RATIO 1" dialog box appears. TRIGGER. User selects **FORCE RATIO** from "USER OPTIONS" pull-down.		X	



TAF ANALYST/WORKSTATION ACTIONS. Since the Analyst knows there was a discrepancy between ground truth and perceived truth combat effectiveness, he decides to compare the unit's perceived force ratio with the unit's ground truth force ratio. The Analyst selects **Perceived Truth**, **Ground Truth**, and **Continue**.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show perceived truth and ground truth force ratios prior to mission execution. (CONTINUED)								
MCS DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
NONE.	**DISPLAY 6 :** *Plan View.* Show perceived truth of BN/TF area of operation.		**X**		**DISPLAY 6c :** *Dialog Box.* The "FORCE RATIO 2" dialog box appears. TRIGGER. User selects one or more options from the "FORCE RATIO 1" dialog box and **Continue**.		**X**	



TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **Continue**, the "FORCE RATIO [2]"message box appears. The Analyst selects the BLUFOR unit(s), then **Continue**.

C4I PERFORMANCE ASSESSMENT MATRIX

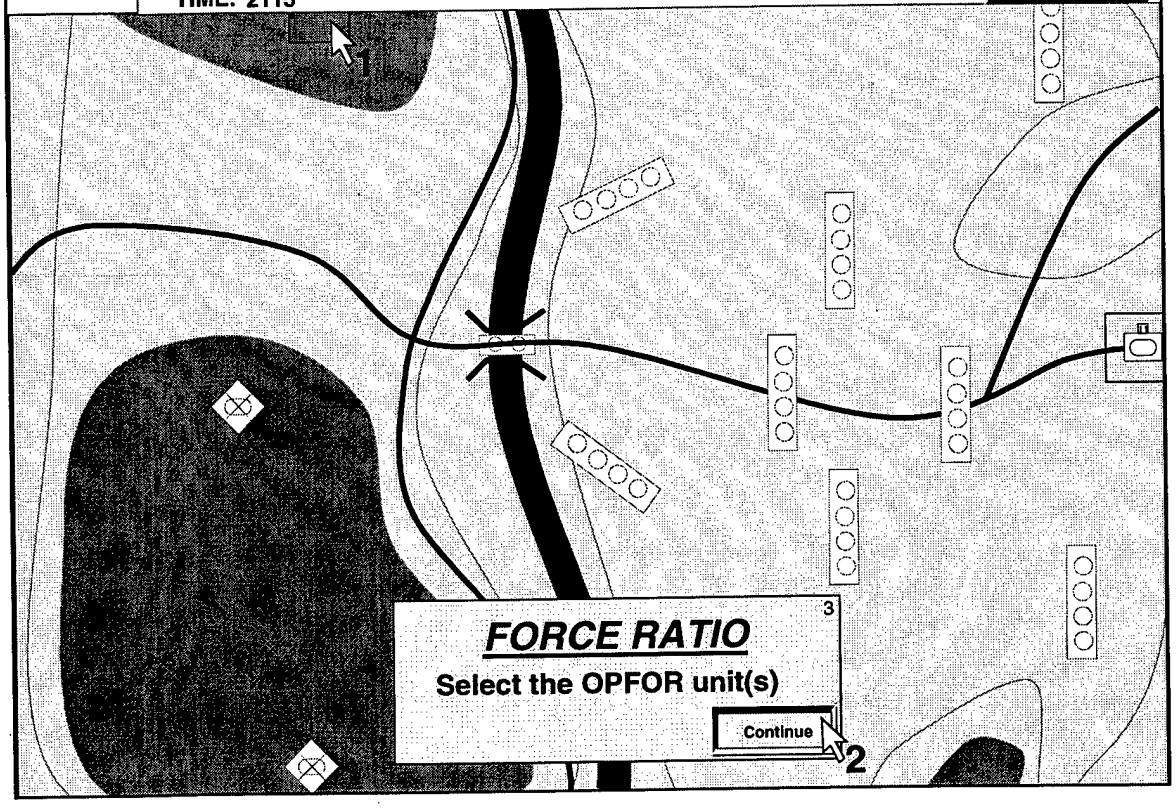
INTENT : Show perceived truth and ground truth force ratios prior to mission execution. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 6 :** *Plan View.* Show perceived truth of BN/TF area of operation.		X		**DISPLAY 6d :** *Dialog Box.* The "FORCE RATIO 3" dialog box appears. TRIGGER. User selects one or more BLUFOR units and **Continue**		X	

DISPLAY 6, 6d

INTENT: Show perceived truth and ground truth force ratios prior to mission execution. (Continued)

TIME: 2115

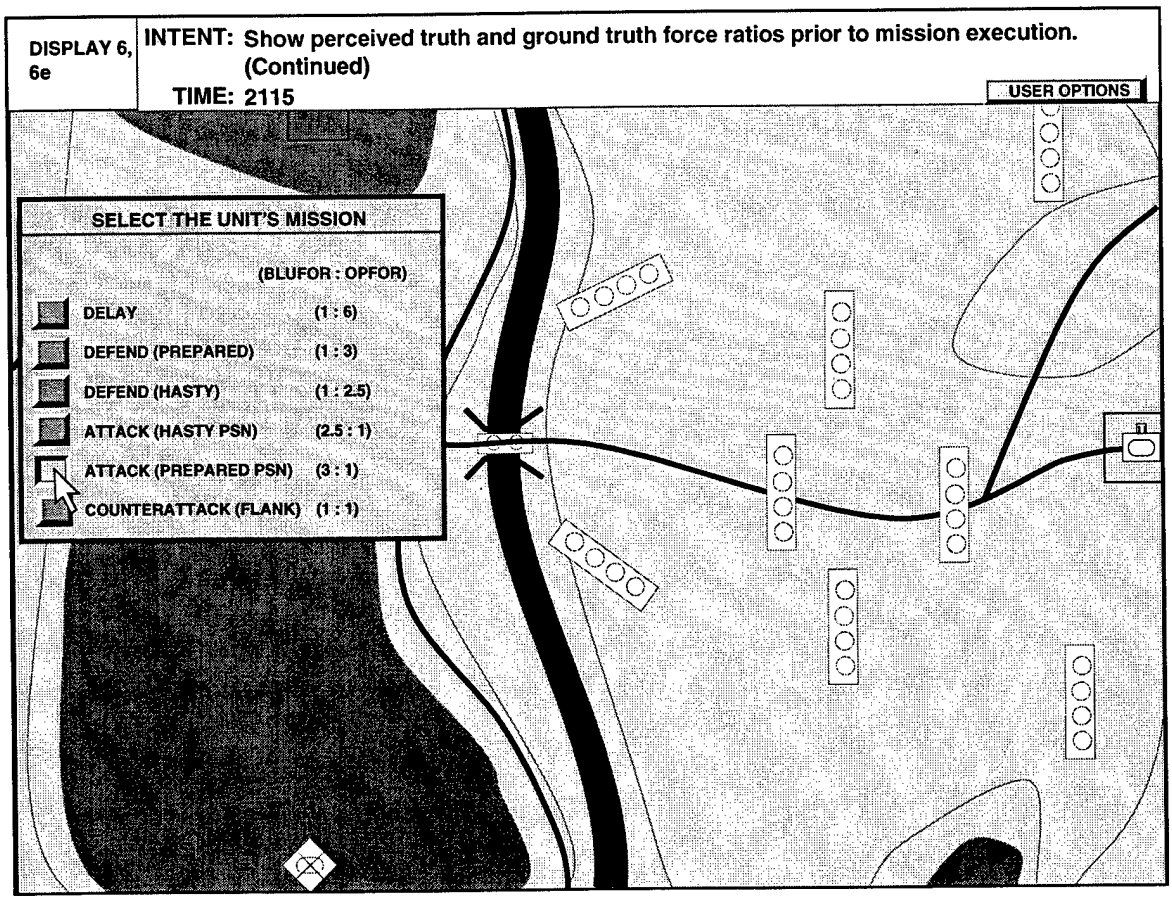


TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **Continue** on the "FORCE RATIO [2]" dialog box, the "FORCE RATIO [3]" message box appears. The Analyst selects the OPFOR unit(s) and then **Continue**.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show perceived truth and ground truth force ratios prior to mission execution. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 6 :** *Plan View.* Show perceived truth of BN/TF area of operation.		X		**DISPLAY 6e :** *Dialog Box.* System displays the "SELECT THE UNIT'S MISSION" dialog box appears. TRIGGER. User selects one or more OPFOR units and **Continue**		X	

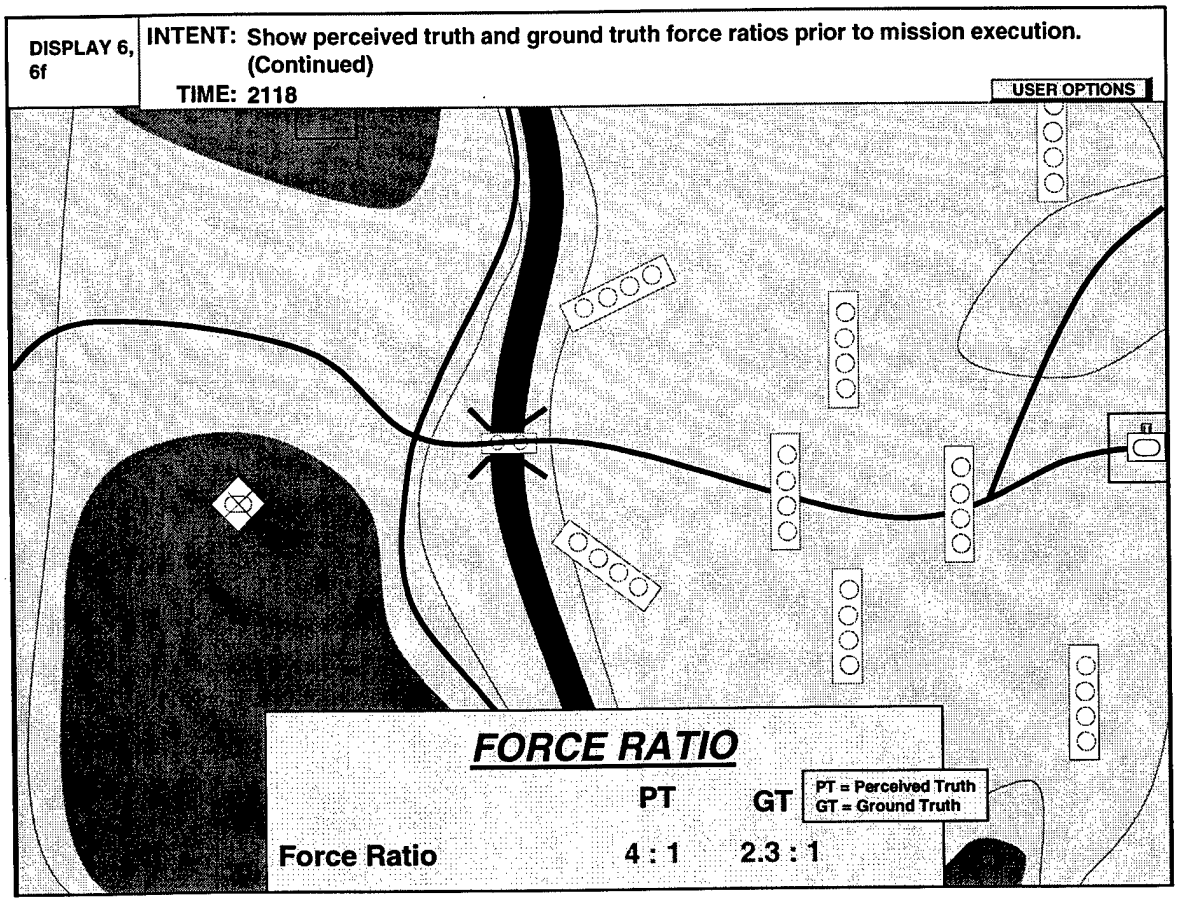


TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **Continue** on the "FORCE RATIO [3]" dialog box, the "SELECT THE UNIT'S MISSION" dialog box appears. The Analyst searches the unit mission statement from the latest Bn TF 2-2 WO and selects the appropriate mission. Although the initial mission for Bn TF 2-2 is to breach, its follow-on mission is to attack, therefore, the Analyst selects **ATTACK (PREPARED POSITION (PSN).** The Analyst notes Bn TF 2-2 needs a 3 : 1 force ratio.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show perceived truth and ground truth force ratios prior to mission execution. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 6 :** *Plan View.* Show perceived truth of BN/TF area of operation.		**X**		**DISPLAY 6f :** *Message Box.* System computes Force Ratio and displays the information in the message box. TRIGGER. User selects the mission of the unit to be analyzed.		**X**	**X**



TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects the mission from the "SELECT THE UNIT'S MISSION" dialog box, the system calculates the perceived truth and ground truth force ratio.

The system obtained OPFOR perceived truth from Bn TF S2 updates to MCS. The instrumentation system provided OPFOR ground truth. The system obtained BLUFOR combat effectiveness values for perceived truth from digital logistics reports. The system obtained ground truth values from information entered by the Analyst following coordination with OCs on the unit's actual combat effectiveness status. Using these OPFOR and BLUFOR values for ground and perceived truth, the system computed the force ratios shown above.

The system color codes the force ratio. If the force ratio is within the established standards for the particular mission, the figure is green. If the force ratio is lower than the established standard, the figure is red. In this case, the perceived truth force ratio is green and the ground truth force ratio is red. NOTE: The Analyst must complete Combat Effectiveness entries before the system will compute force ratios.

DISCUSSION POINTS FOR AAR DISPLAY 6

WHAT HAPPENED:(Trainer Entry)

Force ratio was not compatible with assigned mission.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. Did you perform a force ratio evaluation on your MCS?

2. From where did you get your OPFOR combat effectiveness figures?

3. How old was your OPFOR information?

4. Had you known the ground truth force ratio, would that have affected your mission planning?

5. Did this force ratio have an impact on the accomplishment of your mission?

HOW TO IMPROVE:(System Entry)

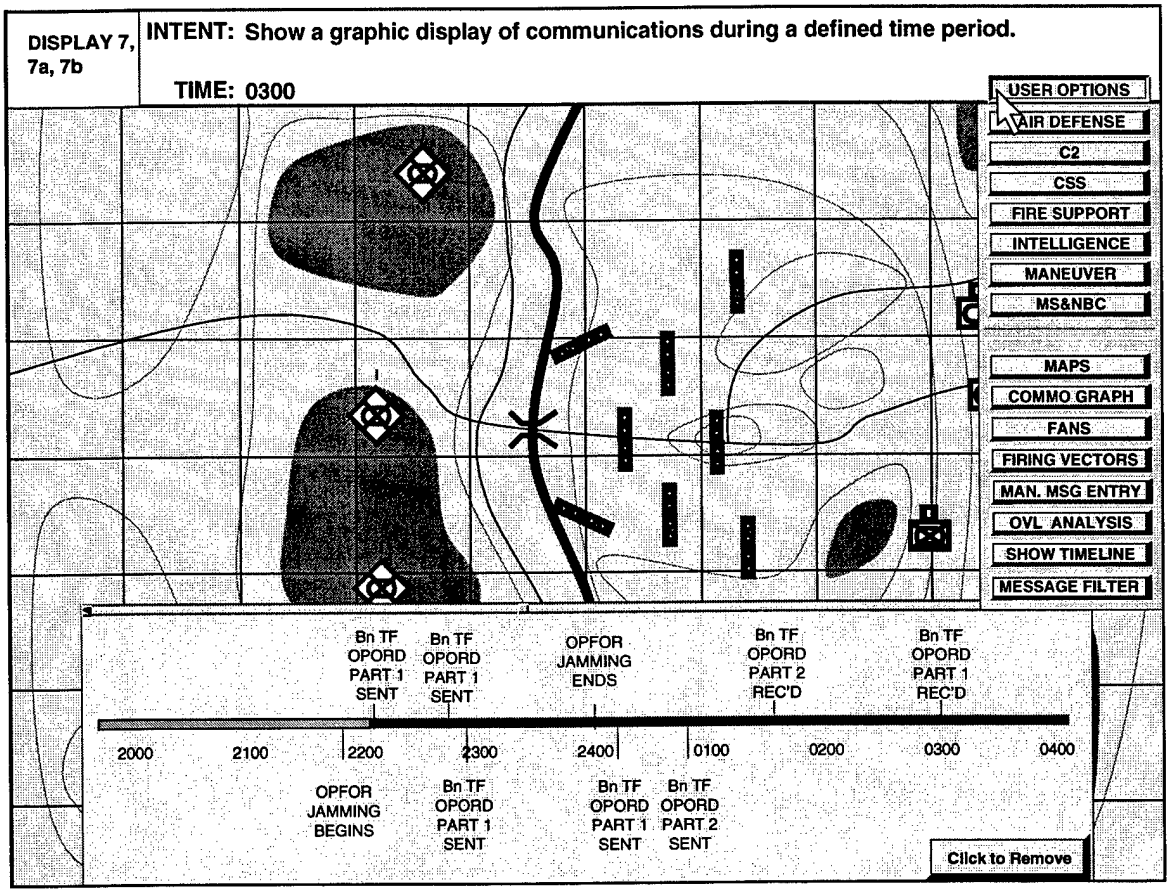
Force ratio is the overall relationship of enemy versus friendly combat power. It provides conclusions about friendly capabilities pertaining to the operation being planned. It analyzes all the available combat power of friendly forces and enemy forces, assuming that all forces are in contact at once. To attack a prepared or fortified position, the unit should have a force ratio of 3:1. If the attack is of a hasty position, the force ratio can be 2.5:1.

Reference: FM 71-123

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show a graphic display of communications during a defined time period.

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 7 :** *Plan View.* Show ground truth of BN/TF area of operation.		**X**		**DISPLAY7a :** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with MTP standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. When the user clicks **SHOW TIMELINE** from the "USER OPTIONS" pull-down, the timeline (consisting of filtered messages from the selected unit) up to that point, will appear until the user clicks **Click to Remove** **DISPLAY 7b :** *Pull-Down Menu.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. User selects **USER OPTIONS**		**X**	

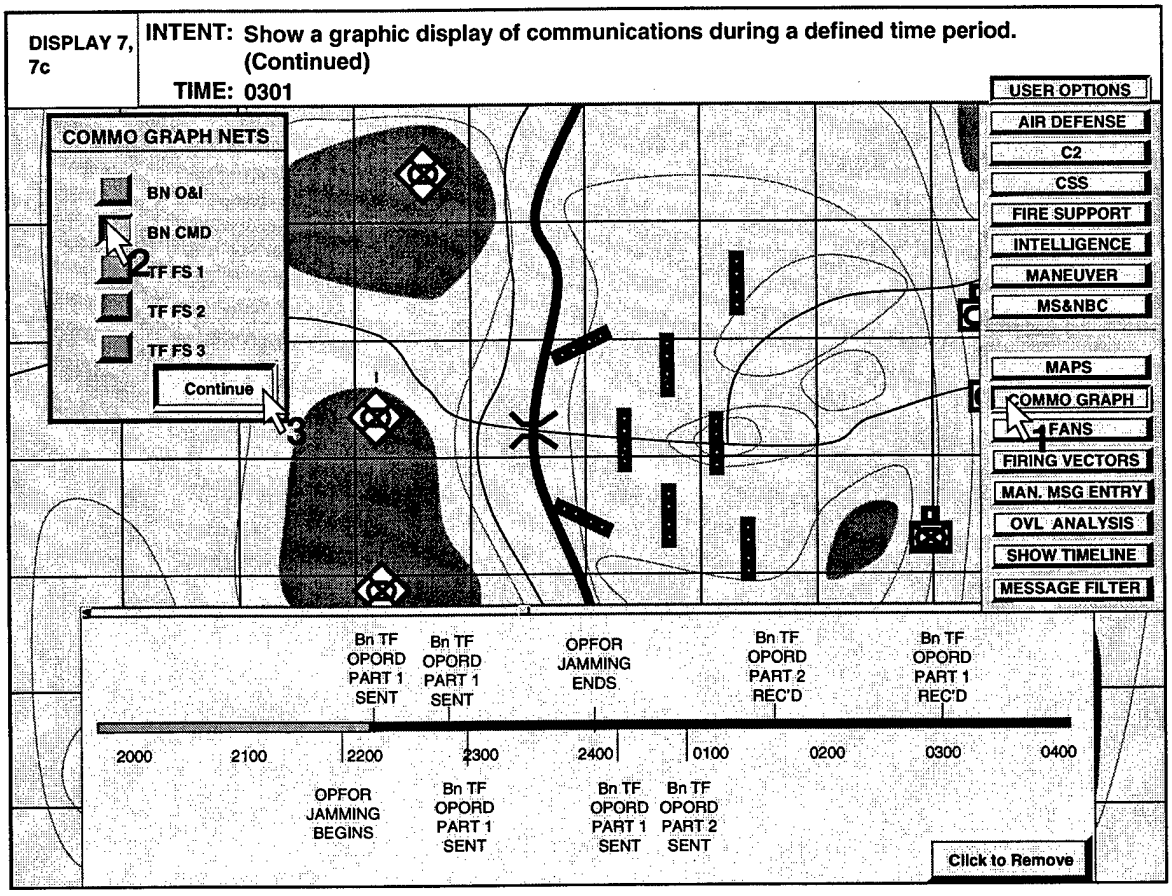


TAF ANALYST/WORKSTATION ACTIONS. The Analyst notes OPFOR was jamming while Bn TF 2-2 was attempting to send its OPORD. To see the effects of the jamming, the Analyst decides to create a graph that will show the types of communication occurring on specific communications nets during the OPFOR jamming. The Analyst selects **USER OPTIONS** to reveal the "COMMO GRAPH" button.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show a graphic display of communications during a defined time period. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 7 :** *Plan View.* Show ground truth of BN/TF area of operation.		X		**DISPLAY 7c :** *Dialog Box.* "COMMO GRAPH NETS" dialog box appears. TRIGGER. User selects**COMMO GRAPH**from "USER OPTIONS" pull-down.		X	



TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **COMMO GRAPH**, the "COMMO GRAPH NETS" dialog box appears. The Analyst selects the communications net(s) he wants to graph. Since Bn TF 2-2 OPORD was sent over the BN CMD net, he selects **BN CMD**. After making his selection(s), he selects **Continue.**

C4I PERFORMANCE ASSESSMENT MATRIX

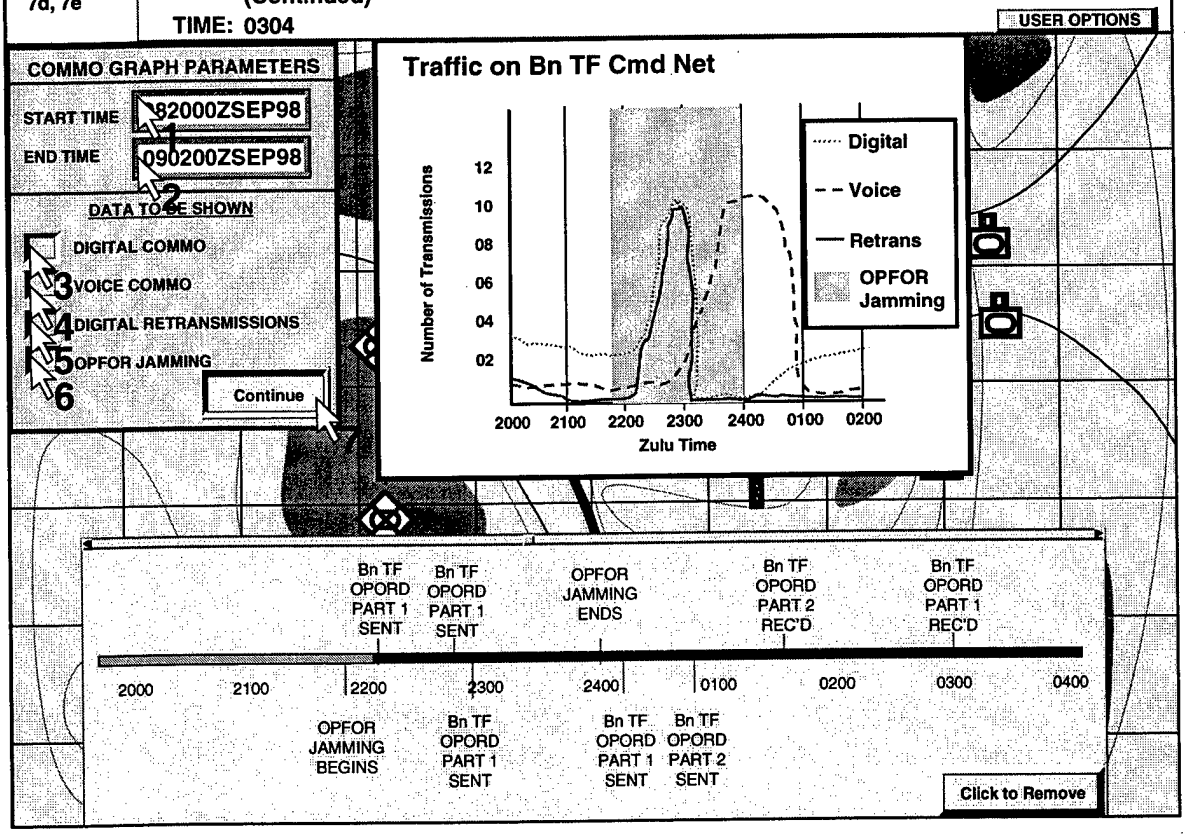
INTENT : Show a reason why OPORD took a long time to transmit. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 7 :** *Plan View.* Show ground truth of BN/TF area of operation.		X		**DISPLAY 7d :** *Dialog Box.* "COMMO GRAPH PARAMETERS" dialog box appears. TRIGGER. User selects one or more options from the "COMMO GRAPH NETS" dialog box and **Continue.** **DISPLAY 7e :** *Graph.* The "Traffic on ____ Net" graph appears. TRIGGER. The system takes the information from user input in the "COMMO GRAPH PARAMETERS" dialog box, creates and displays the graph.		X	X

DISPLAY 7, 7d, 7e

INTENT: Show a graphic display of communications during a defined time period. (Continued)

TIME: 0304



SCENARIO. Bn TF 2-2 tries several times to send its OPORD, detects OPFOR jamming, and reverts to voice traffic. Once the Bn TF realizes the jamming has stopped, the Bn TF CDR directs digital traffic to resume.

TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **Continue** from the "COMMO GRAPH NETS" dialog box, the "COMMO GRAPH PARAMETERS" dialog box appears as well as the shell of the "Traffic on Bn TF Command Net" graph. The Analyst enters the time he wants the graph to begin in the "START TIME" box. When he enters the start time, the system enters the time on the graph. Next, the Analyst enters the time he wants the graph to end in the "END TIME" box. The system evenly divides the time between start and finish and places the gridlines on the graph. The system also detects the maximum number of transmissions during the requested time and creates the y-axis graduations. As the Analyst selects each of the four buttons, the system draws that portion of the graph and creates/adds to the legend.

DISCUSSION POINTS FOR AAR DISPLAY 7

WHAT HAPPENED:(Trainer Entry)

OPFOR jamming caused a shift to voice for two hours.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. What measures do you take to defeat or work-around the jamming?

HOW TO IMPROVE:(System Entry)

Information and INFOSYS must be protected at the electronic, physical, and human levels, as described in relationship to the potential threat - all without impeding the overall operation. Protecting computer and communications systems from enemy intrusion, disruption, and destruction is an initial basic step in an overall protection approach. Because of the complexity and fragility of INFOSYS, a unit's plans should include procedures for operating without all the information infrastructure.

Continue to communicate while the enemy attempts to jam communications. Submit MIJI reports within five minutes after attempted jam, using MCS or FBCB2 reports.

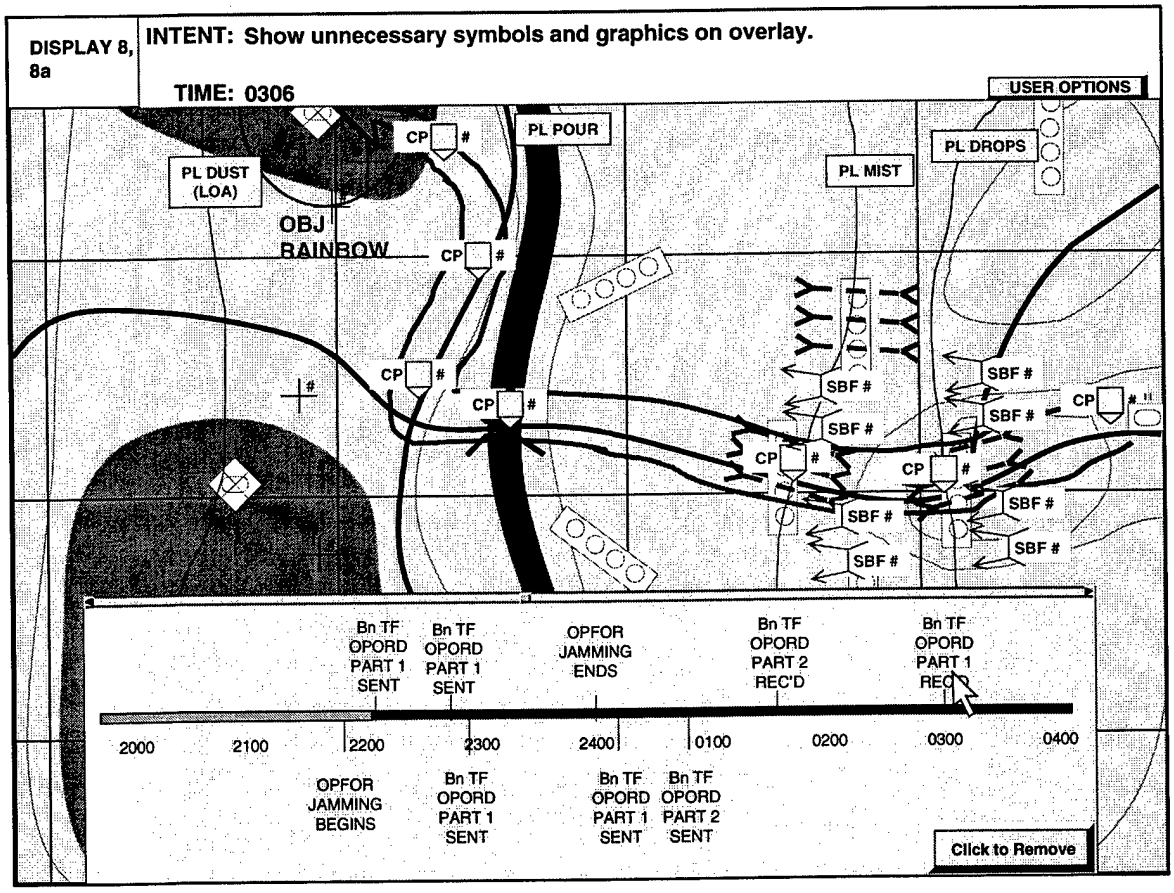
The Bn TF must plan for operating in a degraded information infrastructure environment and have procedures for compensating for the interruption and/or loss of INFOSYS.

Reference: FM 100-6, FKSM 71-2-1-(EXFOR)-MTP, FKSM 71-2-1 (EXFOR)

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show unnecessary symbols and graphics on overlay.

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF 2-2 operations overlay. TRIGGER. User clicks on **BN TF OPORD PART 1 REC'D** on the Timeline.	**DISPLAY 8 :** *Plan View.* Show BN/TF 2-2 operations overlay over perceived truth of BN/TF area of operation.		X	X	**DISPLAY 8a :** *Timeline.* Graphically shows, in timeline format, when the system senses message traffic. The timeline compares receipt times with MTP standards (when applicable). A hashed line will connect the receipt points when the unit meets the standard. Once the unit breaks the MTP standard, the line becomes solid at that point on the timeline. TRIGGER. When the user clicks**SHOW TIMELINE** from "USER OPTIONS", the timeline (consisting of filtered messages from the selected unit) up to that point, will appear until the user clicks**Click to Remove**.		X	X



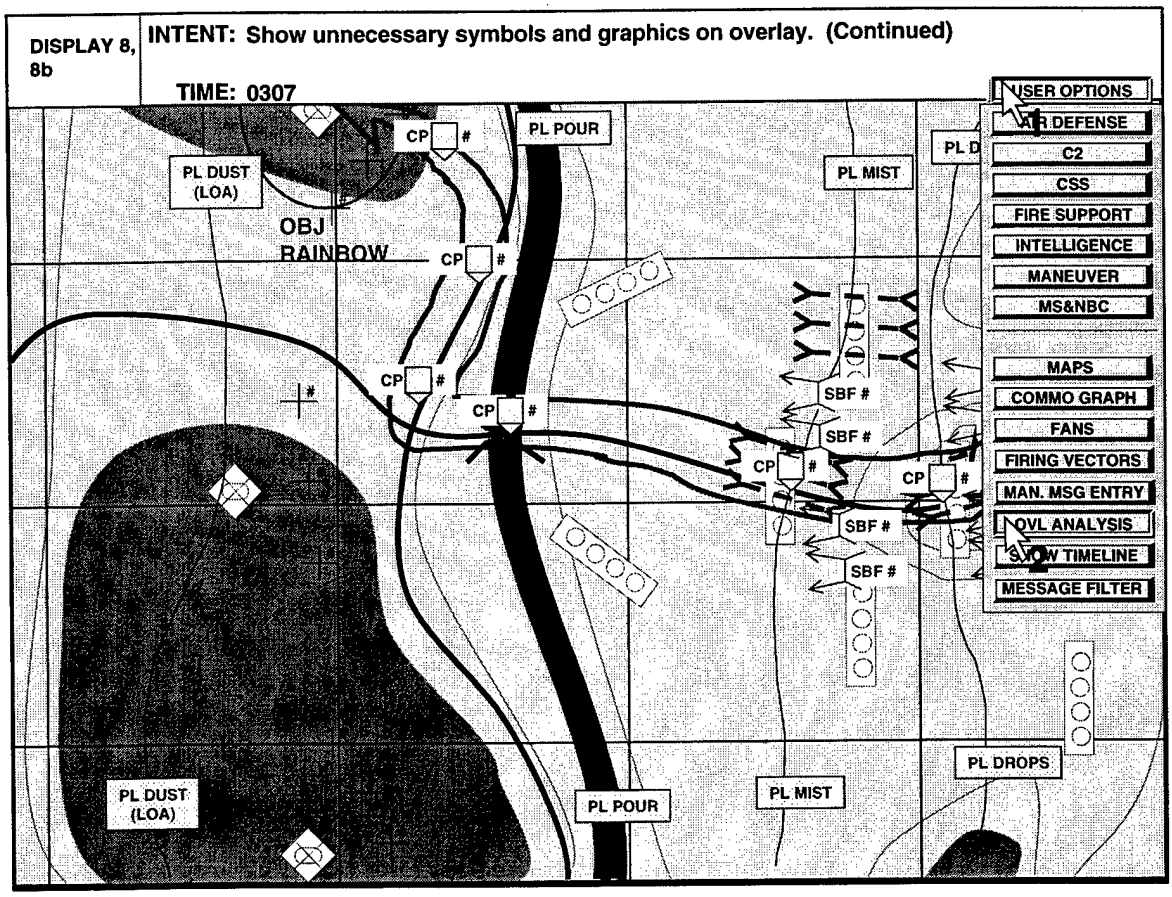
TAF ANALYST/WORKSTATION ACTIONS. The Analyst observes that the Bn TF OPORD, Part 1 (containing the Operations Overlay) took almost 3 hours to receive and arrived as the attack commenced. The Analyst selects the **Bn TF OPORD PART 1 REC'D** to display the overlay. He notes the large amount of graphics and decides to analyze the overlay.

SCENARIO. Bn TF 2-2 sent an overlay with their last warning order. Since the main part of the OPORD was received at 0145, the subordinate units were able to modify their existing overlays with the text.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show unnecessary symbols and graphics on overlay. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF 2-2 operations overlay. TRIGGER. User clicks on **BN TF OPORD PART 1 REC'D** on the Timeline.	**DISPLAY 8 :** *Plan View.* Show BN/TF 2-2 operations overlay over perceived truth of BN/TF area of operation.		X		**DISPLAY 8b :** *Pull-Down Menu.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. User selects **USER OPTIONS**		X	

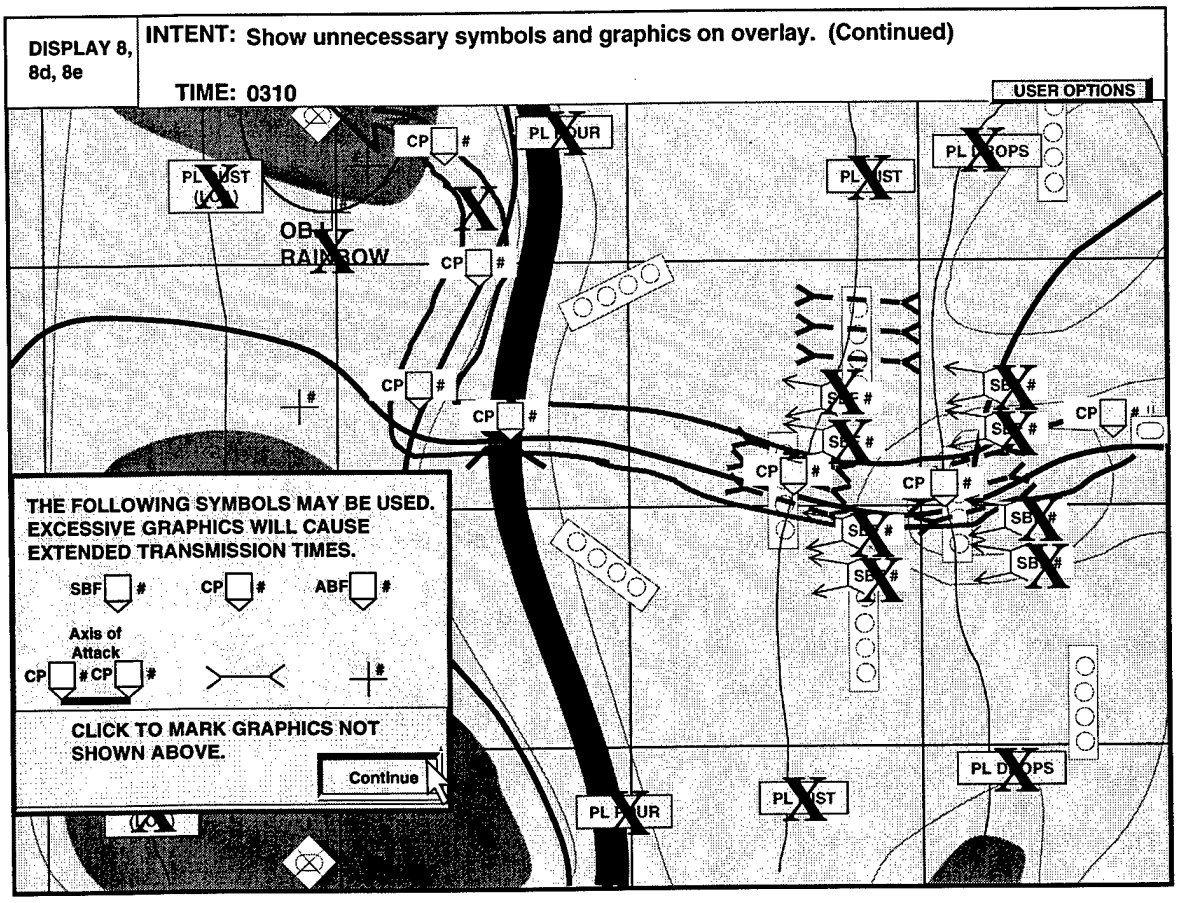


TAF ANALYST/WORKSTATION ACTIONS. The Analyst selects **USER OPTIONS**, then **OVL ANALYSIS**. This selection will allow the Analyst to compare suggestions to minimize graphical annotations with the overlay prepared by the player unit.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show unnecessary symbols and graphics on overlay. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF 2-2 operations overlay. TRIGGER. User clicks on **BN TF OPORD PART 1 REC'D** on the Timeline.	**DISPLAY 8 :** *Plan View.* Show BN/TF 2-2 operations overlay over perceived truth of BN/TF area of operation.			**X**	**DISPLAY 8d :** *Message Box.* "Instructions for Overlay Analysis" message box appears. TRIGGER. User selects **OVL. ANALYSIS** from "USER OPTIONS" pull-down. **DISPLAY 8e :** *User Graphics.* Large black Xs appear, denoting unnecessary graphical annotations. TRIGGER. User uses mouse to select excess overlay graphics. Upon completion, the User selects **Continue**.		**X**	**X**



TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **OVL ANALYSIS**, the message box appears. The Analyst matches the graphics used by the unit with the example graphics in the message box and clicks on each symbol on the overlay that is not shown in the message box. The system places an X where the Analyst clicks. When finished, the Analyst selects **Continue**.

DISCUSSION POINTS FOR AAR DISPLAY 8

WHAT HAPPENED: (Trainer Entry)

Transmission time for OPORD Part 1 was excessive.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

What is your SOP regarding use of symbols within MCS/FBCB2?

HOW TO IMPROVE: (System Entry)

Checkpoints are entered and connected with lines to designate an axis of advance or direction of attack. Checkpoints, by themselves, can be labeled as "support by fire (SBF)" or "ABF" to indicate support or attack by fire positions respectively. Checkpoints are also planned beyond the objective to facilitate consolidation once the objective is secured. TRPs and Objectives (OBJs) are typical control measures that are entered into the FBCB2 for an offensive operation, however, the OBJ is usually not labeled.

The staff must exercise discretion in determining which control measures should be included on FBCB2 overlays. The size of the screen on the FBCB2 prohibits a direct transfer of control measures from an acetate overlay to its FBCB2 equivalent and extensive graphics can cause the system to become sluggish or fail.

See page 4-48 FKSM 71-2-1 (EXFOR) for an example. See X'd out overlay following.

Reference: FKSM 71-2-1 (EXFOR)

C4I PERFORMANCE ASSESSMENT MATRIX

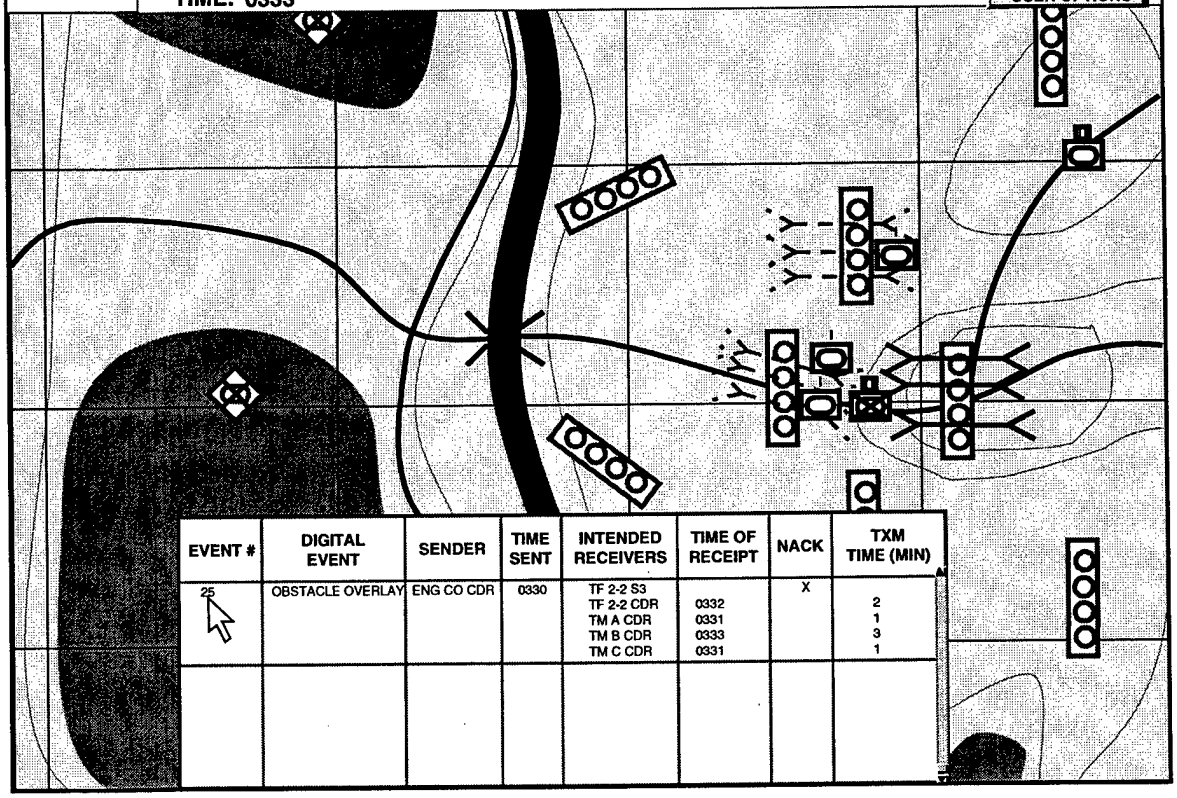
INTENT : Show TOC location and its relation to the battle.

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF 2-2 obstacle overlay. TRIGGER. User selects "EVENT #" 25 with his mouse.	**DISPLAY 9 :** *Plan View.* Show ground truth of BDE area of operation.		X		**DISPLAY 9a :** *Digital Message Log.* Shows each filtered message type and unit selected by operator as it is transmitted and keeps a running log of the messages until the user changes the message filter selection. TRIGGER. When the system senses a filtered message, it enters the message information into the Digital Message Log.		X	

DISPLAY 9, 9a

INTENT: Show TOC location and its relation to the battle.

TIME: 0333



EVENT #	DIGITAL EVENT	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	TXM TIME (MIN)
25	OBSTACLE OVERLAY	ENG CO CDR	0330	TF 2-2 S3		X	
				TF 2-2 CDR	0332		2
				TM A CDR	0331		1
				TM B CDR	0333		3
				TM C CDR	0331		1

SCENARIO. Bn TF 2-2 has just completed breaching the firsset of obstacles. The unit was unable to breach in the proposed locations and the engineer CDR created and disseminated the obstacle overlay to show where the actual breaches are. The unit is about to begin breaching the second set of obstacles.

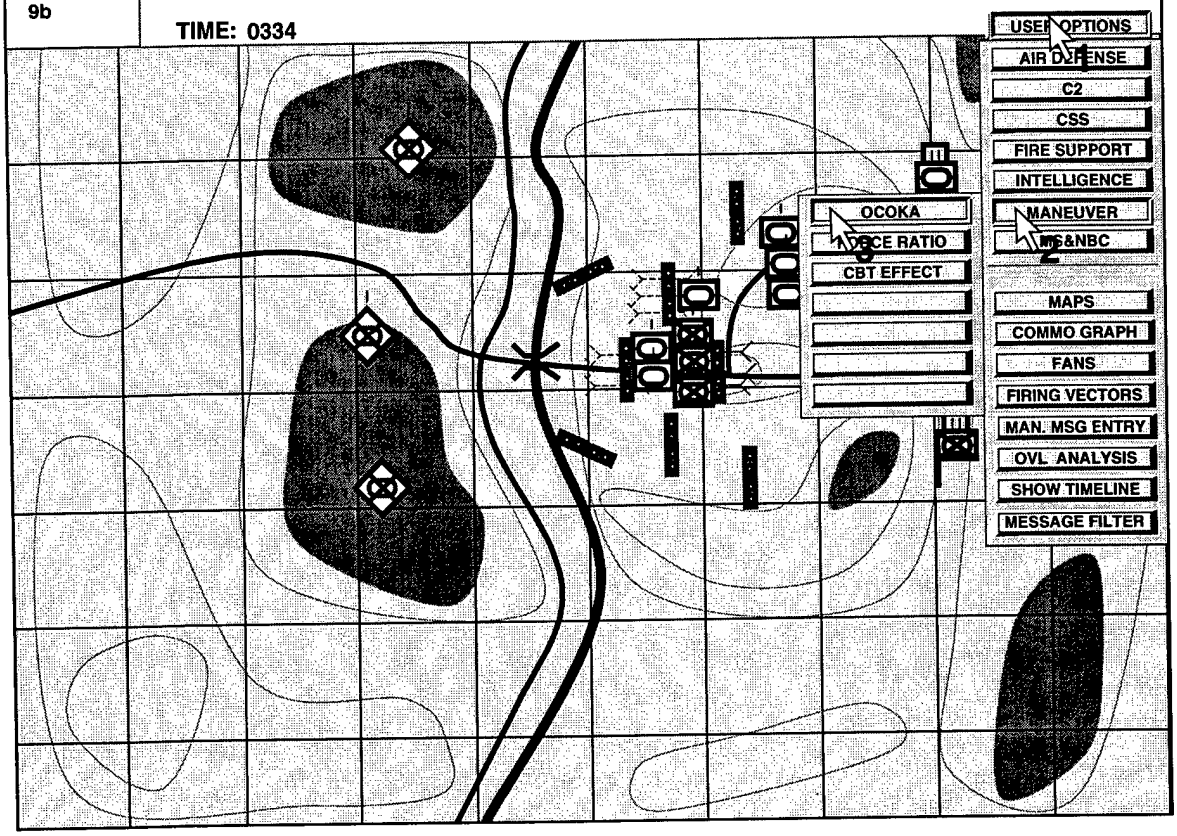
TAF ANALYST/WORKSTATION ACTIONS. The Analyst notes Bn TF 2-2 S3 returned a NAK (non-acknowledgement) indicating that the S3 did not receive the OBSTACLE OVERLAY. The Analyst clicks on **EVENT # 25** and the system displays the obstacle overlay over ground truth. He decides to try to find out why Bn TF 2-2 S3 did not receive the message.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TOC location and its relation to the battle. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF 2-2 obstacle overlay. TRIGGER. User selects "EVENT #" 25 with his mouse.	**DISPLAY 9 :** *Plan View.* Show ground truth of BDE area of operation.		X		**DISPLAY 9b :** *Pull-Down Menu.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. User selects**USER OPTIONS**		X	

DISPLAY 9, 9b	INTENT: Show TOC location and its relation to the battle. (Continued)



TAF ANALYST/WORKSTATION ACTIONS. Since the other addressees received the overlay, the Analyst decides to see if Bn TF 2-2 TOC had electronic line-of-sight (ELOS) with the engineer unit sending the overlay. He selects **USER OPTIONS**, then **OCOKA**.

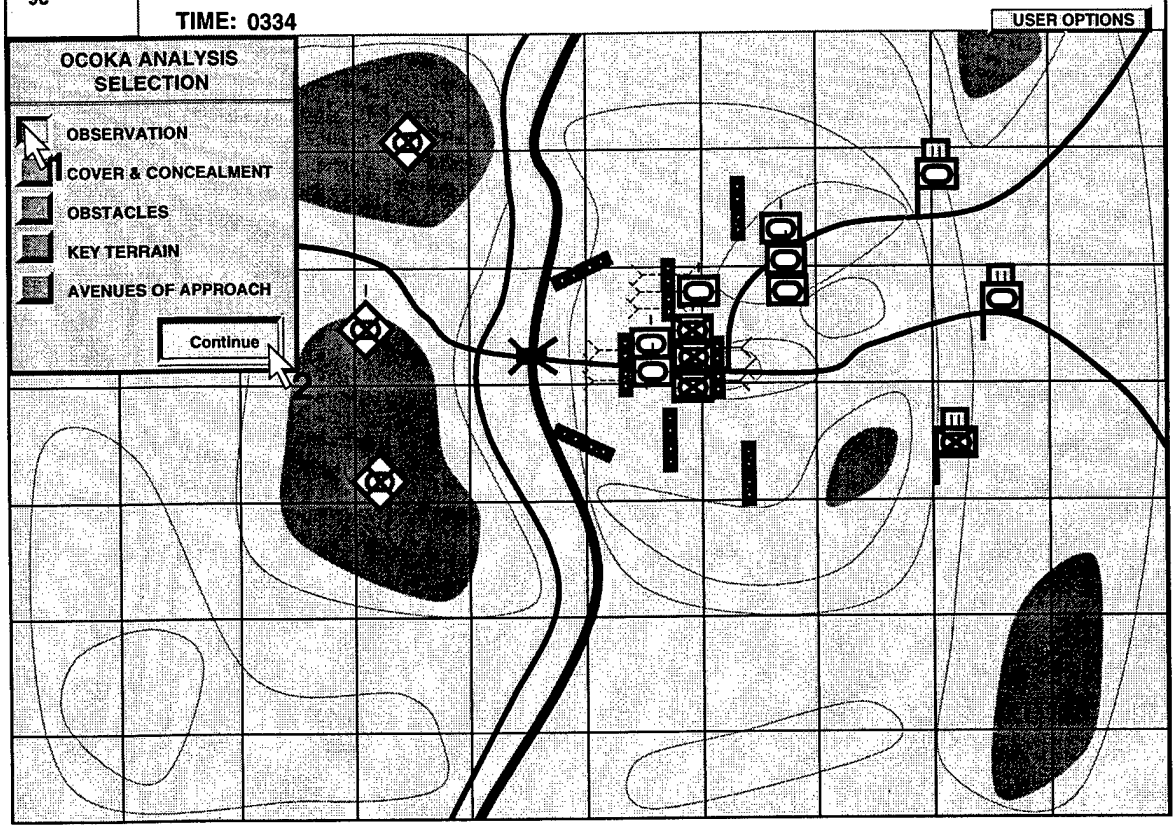
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TOC location and its relation to the battle. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF 2-2 obstacle overlay. TRIGGER. User selects "EVENT #" 25 with his mouse.	**DISPLAY 9 :** *Plan View.* Show ground truth of BDE area of operation.		**X**		**DISPLAY 9c :** *Dialog Box.* "OCOKA Analysis Selection" dialog box appears. TRIGGER. User selected **OCOKA** from "USER OPTIONS" pull-down.		**X**	

DISPLAY 9, 9c	INTENT: Show TOC location and its relation to the battle. (Continued)

TIME: 0334

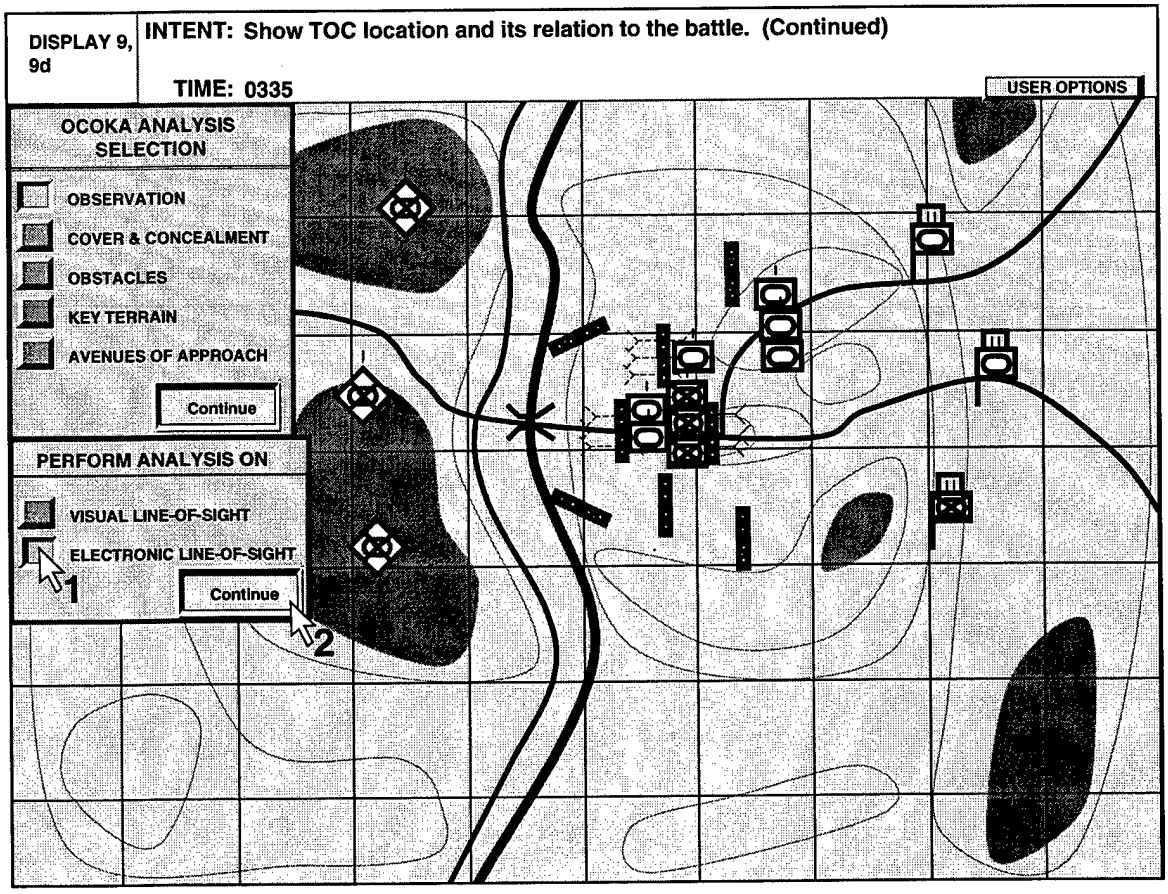


TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **OCOKA** from the "USER OPTIONS" pull-down, the "OCOKA ANALYSIS SELECTION" dialog box appears. Since the Analyst knows ELOS is under the category Observation, he selects **OBSERVATION** and **Continue**.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TOC location and its relation to the battle. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF 2-2 obstacle overlay. TRIGGER. User selects "EVENT #" 25 with his mouse.	**DISPLAY 9 :** *Plan View.* Show ground truth of BDE area of operation.		X		**DISPLAY 9d :** *Dialog Box.* "Perform Analysis On" dialog box appears. TRIGGER. User selects **Observation** from "OCOKA Analysis Selection" dialog box and **Continue**.		X	

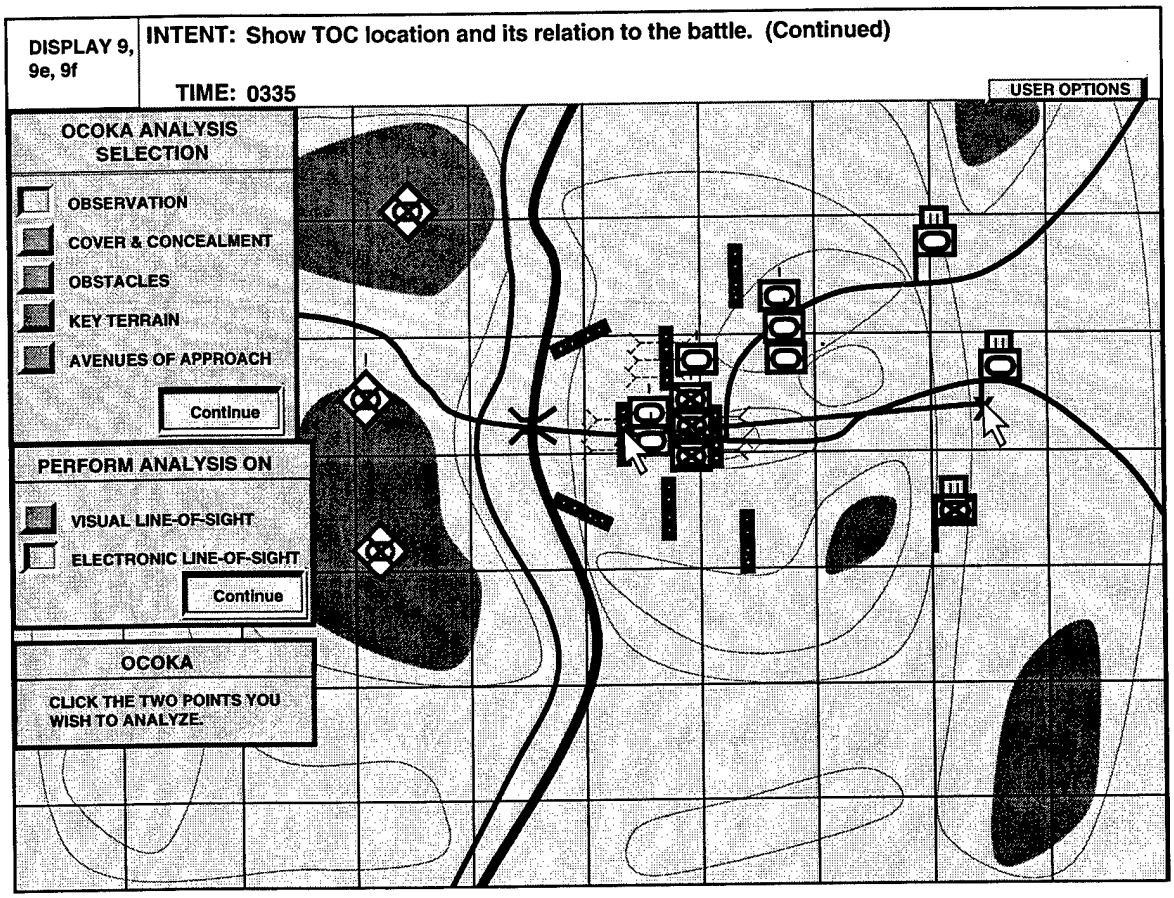


TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **OBSERVATION**, the "PERFORM ANALYSIS ON" dialog box appears. The Analyst selects **Electronic Line-Of-Sight** and then **Continue**.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TOC location and its relation to the battle. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF 2-2 obstacle overlay. TRIGGER. User selects "EVENT #" 25 with his mouse.	**DISPLAY 9 :** *Plan View.* Show ground truth of BDE area of operation.		X		**DISPLAY 9e :** *Message Box.* The "OCOKA instructions" message box appears. TRIGGER. User selects from "Perform Analysis On" dialog box and**Continue**. **DISPLAY 9f :** *User Graphics.* A blue line between two points appears. TRIGGER. User selects 2 points on the map with the mouse as the system instructed.		X	

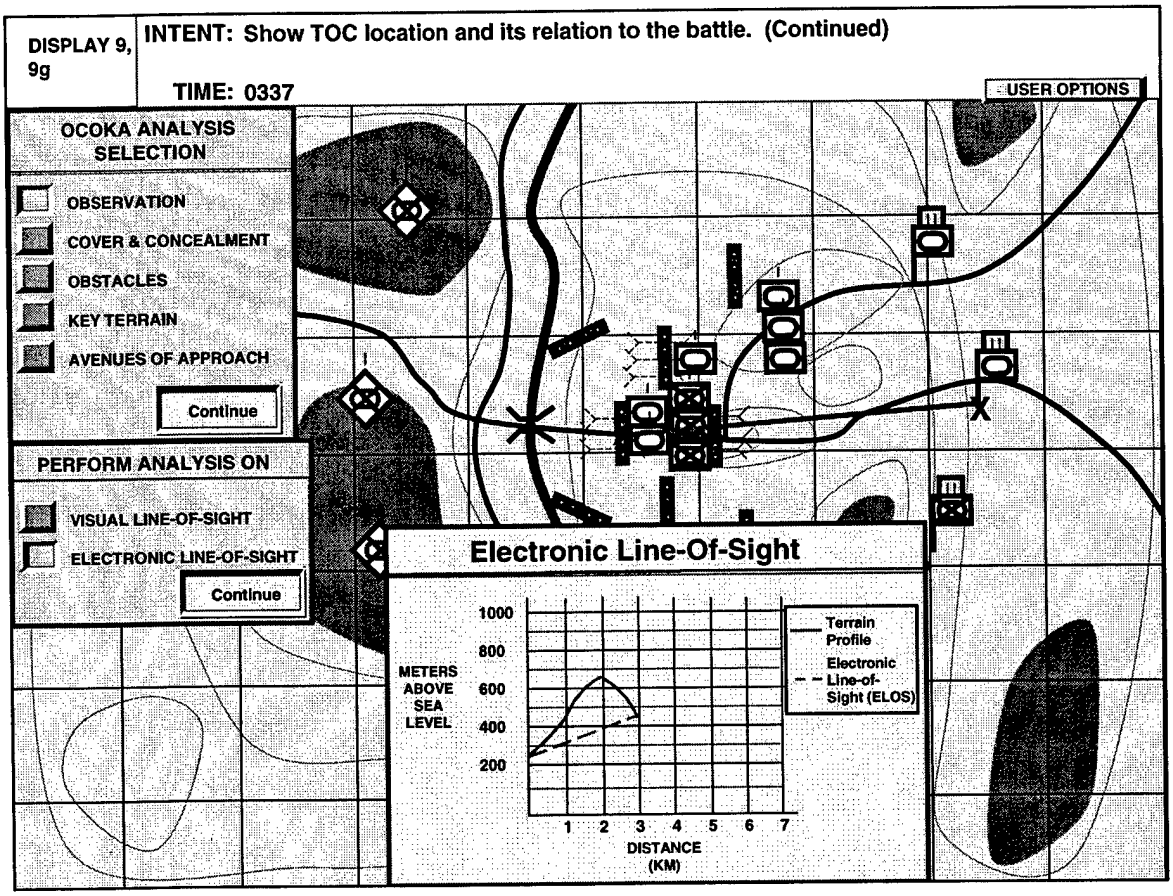


TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects **Electronic Line-Of-Sight**, the "OCOKA" message box appears. The Analyst selects the Bn TF 2-2 TOC position and the position where the engineer CDR sent the overlay from. The system draws a line from the first selected point to the second.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TOC location and its relation to the battle. (CONTINUED)

MCS DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
BN/TF 2-2 obstacle overlay. TRIGGER. User selects "EVENT #" 25 with his mouse.	**DISPLAY 9 :** *Plan View.* Show ground truth of BDE area of operation.		X	X	**DISPLAY 9g :** *Graph.* "Electronic Line-Of-Sight" graph appears. TRIGGER. The system constructs a blue line between the two user-defined points.		X	X



TAF ANALYST/WORKSTATION ACTIONS. After the Analyst selects the second point, the system draws the "Electronic Line-Of-Sight" graph. The system profiles the contour elevations of the line on the map and graphically portrays the data. The system connects the start and end points on the graph. If the ELOS line is above the terrain profile, there IS electronic line-of-sight. If the ELOS line is below the terrain profile (as above), there is NO electronic line-of-sight.

DISCUSSION POINTS FOR AAR DISPLAY 9

WHAT HAPPENED:(Trainer Entry)

Bn TF 2-2 TOC did not receive the Engineer obstacle overlay.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. Did you conduct an electronic line-of-sight evaluation from the proposed Bn TF TOC location along the axis of attack?

2. What actions did the Bn TF CMD GP take to inform the BDE of the locations of the lanes through the obstacles?

HOW TO IMPROVE:(System Entry)

During the planning process, the staff must first identify where the critical points on the battlefield will be located. The staff then conducts backward planning to determine where the TOC must be located at that point to facilitate command and control.

The main CP should be located on trafficable and defensible ground and in an area large enough to contain all vehicles. Additional considerations for positioning the main CP are: ensure line-of-sight (LOS) communications with combat net radios, TI, and MSE; encourage redundant commo; use terrain masking to help shield signals from the enemy; use defensible terrain to enhance security (cover and concealment); position the CP close to maneuver units for mutual support and local security; and locate the CP near existing road networks but out of sight from possible enemy observation.

Reference: CTC Trends No. 98-4 FEB 98, FKSM 71-2-1 (EXFOR)

APPENDIX E:
FORCE XXI BATTLE COMMAND BRIGADE AND BELOW (FBCB2) COMPANY TEAM TRAINING SCENARIO

The entries for FBCB2 COMPANY/TEAM TASK MATRIX are taken from various sources. Information for the TASK and KEY ELEMENTS column is taken from Chapter 5 of FKSM 71-1-1-(EXFOR)-MTP Mission Training Plan for the Digitized Tank and Mechanized Infantry Company Team. Entries for the APPLICABLE TTP column were taken from FKSM 71-1-1 (EXFOR) The Digitized Tank and Mechanized Infantry Company Team, FKSM 17-15-1(EXFOR) Tank Platoon and FKSM 71-2-1 (EXFOR) The Digitized Heavy Battalion. The input for the FBCB2 INPUT AND OUTPUT column came from the Force XXI - Appliqué Software User's Manual (SUM) for Version 1.0.1 of software.

The intent of each display illustrated in this appendix is stated below.

Display 1. INTENT: Time-tag voice contact report(s) and show Co Tm disposition/actions.

Display 2. INTENT: Alert TAF Analyst to digital contact report.

Display 3. INTENT: Alert TAF Analyst to transmission of digital enemy overlay.

Display 4. INTENT: Alert TAF Analyst to a fratricide .

Display 5. INTENT: Show vector pairing of shooter-to-victim for fratricide incident.

Display 6. INTENT: Show 3 minutes of events leading to fratricide.

Display 7. INTENT: Show fire control instructions in the Co Tm OPORD.

Display 8. INTENT: Compare Co Tm and platoon OPORDS.

FBCB2 COMPANY TEAM TASK MATRIX

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
The company/team commander designates critical graphical control measures, using FBCB2 ORDERS/REQUESTS, FIRES/ALERTS and OVERLAYS.	1. Identifies target reference points in FBCB2 OVERLAYS by using the appropriate graphic function and label.	Use TRPs to designate limits of each platoon sector. TRPs are identified within the engagement areas to establish overlapping sectors of fire and to facilitate shifting and massing fires within the CO/TM. They must be thoughtfully placed and few in number to avoid unnecessarily cluttering the FBCB2 overlay of the engagement area. TRPs should be uniquely shaped and/or marked to permit visibility. During times of limited visibility, the TRP must have a thermal signature that maintains its unique shape and can be observed by the platoon in its BP. TRPs are established by the commander in a preliminary CO/TM sector sketch to platoon leaders prepared on the fire support overlay.	Create the TRPs at the desired location on the Fire Support Overlay and send to platoon leaders.

FBCB2 COMPANY TEAM TASK MATRIX (CONTINUED)

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
The company/team commander designates critical graphical control measures, using FBCB2 ORDERS/REQUESTS, FIRES/ALERTS and OVERLAYS.	2. Establishes sectors of observation and fire for each vehicle and position, in FBCB2 OVERLAYS: FIRE PLAN.	Platoon leaders break assigned sectors down into individual vehicle sectors. Vehicle commanders use the left and right limits assigned by the platoon leader to develop FBCB2 sketch cards. Platoon leaders assign vehicle commanders tentative sectors of fire by preparing a simplified platoon sector sketch on the operations 2 overlay. This sketch includes the TRPs which define the platoon sector. This overlay is digitally transmitted to tank/Bradley commanders and becomes the foundation for their sector sketches. Vehicle commanders verify left and right limits of both primary and secondary sectors of fire, mark dead space within their assigned sectors, and draw trigger lines for all weapons systems. They also annotate protective obstacles (positioned by the platoon) which fall within their assigned sector of fire by lazing to start, end and turn points in the obstacle. Once this additional information is posted to the fire support overlay, it is sent back to the platoon leader for inclusion in the platoon sector sketch. Platoon leaders post individual sector sketches to the preliminary platoon sketch (fire support overlay) prepared earlier. The completed platoon sector sketch is sent digitally to the commander for inclusion in the CO/TM sector sketch. The CO/TM sector sketch is prepared by posting the platoon sector sketches as outlined above. Depending on the unit SOP, it may be forwarded digitally to the S3 for inclusion in the task force fire plan. This overlay is retained as the fire support overlay and is used during the battle to control and distribute direct fire within the CO/TM.	On the Fire Plan Overlay put all vehicles in the correct position and give them their sectors of observation and fire. Send to the platoon leaders.

FBCB2 COMPANY TEAM TASK MATRIX (CONTINUED)

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
The company/team commander designates critical graphical control measures, using FBCB2 ORDERS/REQUESTS, FIRES/ALERTS and OVERLAYS.	3. Disseminates rules and methods of engagement in FBCB2 ORDERS/REQUESTS: FRAGO (or FREE TEXT option).	Rules and methods of engagement are given in paragraph 3c. Coordinating Instructions of digitized OPORD.	Select FRAGO and enter the changing information. Discuss rules and methods of engagement in the Execution paragraph.
The company/team commander designates critical graphical control measures, using FBCB2 ORDERS/REQUESTS, FIRES/ALERTS and OVERLAYS.	4. Informs all personnel of safety guidance for firing near friendly units in FBCB2 ORDERS/REQUESTS: FRAGO (or FREE TEXT option).	Include fratricide risk as a key factor in terrain analysis (OCOKA). Also may be addressed in paragraph 3c. Coordinating Instructions. The CO/TM CDR needs to understand and implement how often and by what protocol the situational awareness will be updated. It can be updated by movement (every X minutes) or both.	Select FRAGO. Enter the information being changed. Place safety guidance in the body of paragraph 3. Execution or in 3c. Execution-Coordinating Instructions. Go to SA AWARENESS SETUP and select the time and distance needed to ensure complete situational awareness. FREE TEXT. Select Free Text, type the message, and send.
The company/team commander designates critical graphical control measures, using FBCB2 ORDERS/REQUESTS, FIRES/ALERTS and OVERLAYS.	5. Establishes engagement priorities in FBCB2 ORDERS/REQUESTS.	Explained in paragraph 3a(1) Scheme of Maneuver of the OPORD.	Call up the OPORD menu and place this information in Execution under 3a(1), Scheme of Maneuver. May also use FRAGO format and place the information in the same paragraph as in the OPORD.
The company/team commander designates critical graphical control measures, using FBCB2 ORDERS/REQUESTS, FIRES/ALERTS and OVERLAYS.	6. Ensures all personnel know signals for commence fire, cease fire, lift fires, and shift fires and tasks for specific weapons or teams.	Explained in paragraph 5b(5) Special Signals, to include use of pyrotechnics. CO/TMs will be reorganized in accordance with OPTEMPO, METT-T, and unit SOP. Network planners will have to ensure necessary modifications are accomplished prior to these reorganization to ensure mission execution. Unit commanders must be cognizant that such changes require advance notification due to the complexity of developing the TI network.	Call up the OPORD menu and place this information in 5b(5) Command and Signal, special signals to include use of pyrotechnics. Place the information here. Can also use the FRAGO format and place the information in the same paragraph.

When building the company team example, we created the C4I PERFORMANCE ASSESSMENT MATRIX second, after completing the ASAS TASK MATRIX. This table describes FBCB2 data and other information the TAF analyst must view or hear to assess the company team's performance. The matrix describes the information the TAF workstation should display and indicates when the workstation should present the information to the analyst. This matrix drove the design of the illustrations we developed in the third step of our methodology.

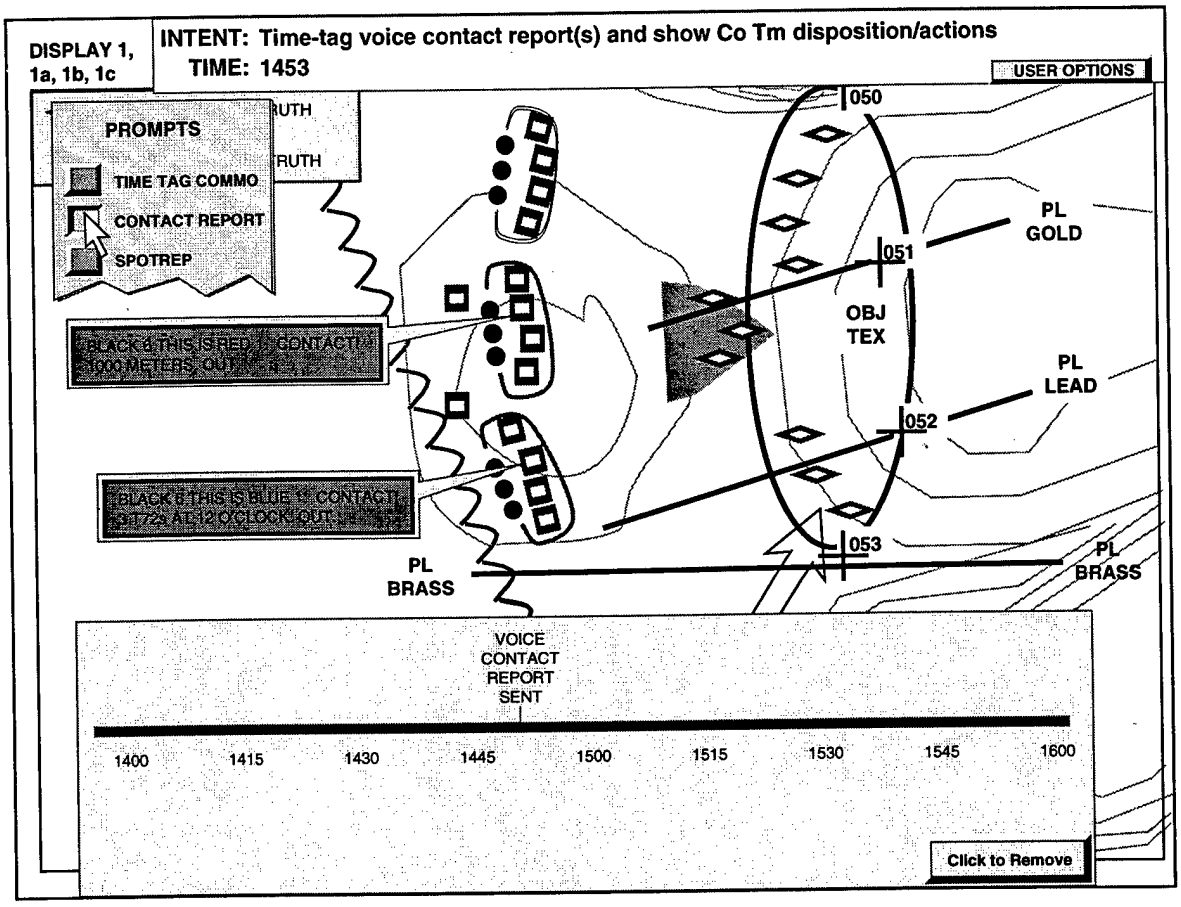
CONVENTIONS: As you proceed through the MCS scenario, you will view proposed displays to assist the training analyst monitor digital communications and assess BLUFOR performance. Below each display is a narrative which addresses the training analyst's interactions with the TAF workstation as he observes BLUFOR digital actions and inactions during the exercise. We will use the conventions below in our narration of various display features and user interface functions as we discuss the trainers interaction with the displays. **BOLD text**- represents analyst selection of an item (mouse click)

Italics - represents analyst-entered data

"Quotes" - represents names of dialog boxes

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Time-tag voice contact report(s) and show CO/TM disposition/actions								
FBCB2 DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
CO/TM fire support overlay.	**DISPLAY 1 :** *Plan View Aid.* Show ground truth disposition and actions of friendly and enemy enitities over the CO/TM fire support overlay.		**X**	**X**	**DISPLAY 1a :** *Dialog Box.* Provides user capability to time-tag exercise events. **DISPLAY 1b :** *Timeline.* Show timeline of events tagged by the user. TRIGGER. Upon hearing the voice contact report the user clicks on the "Contact Report" prompt, which time tags the report and displays the timeline. **DISPLAY 1c :** *Table Aid.* Show digital message log of all messages transmitted or received by the CO/TM as the exercise progresses.		**X**	**X**



TAF ANALYST/WORKSTATION ACTIONS. Upon hearing the first contact report, the TAF analyst clicks on the **Contact Report** button in the "Prompts" menu which notifies his workstation that the Co Tm has submitted a voice contact report. (NOTE: Since exercise players may or may not submit voice reports in the correct format, the workstation relies on the TAF analyst to identify voice messages appearing in the prompt listing rather than relying on voice recognition software). The system automatically displays a timeline depicting when the Co Tm transmitted the voice contact report and continues to display significant communications as the engagement unfolds.

SCENARIO. A Co Tm has been assigned the mission of support-by-fire to B Co Tm in its assault of Objective TEX. Shortly after the Co Tm occupies its support-by-fire position, the RED and BLUE platoon leaders make visual contact with OPFOR and submit voice contact reports to the Co Tm Cdr.

DISCUSSION POINTS FOR AAR DISPLAY 1

WHAT HAPPENED: (Trainer Entry)

Red and Blue platoon contact reports were incomplete.

FACILITATING QUESTIONS (WHY IT HAPPENED) : (System Entry)

1. How complete were the voice contact reports?

2. How well did the voice contact reports compare to OPFOR's actual dispositions?

HOW TO IMPROVE: (System Entry)

The spot report is the preferred method of reporting enemy contact by voice; however, when time is critical the voice contact report provides a means of sending information quickly. The contact report consists of:

Platoon color and/or call sign for the observer

Brief target description

Cardinal direction

Example: "WHITE, THIS IS WHITE FOUR, CONTACT, TANKS, EAST, OUT."

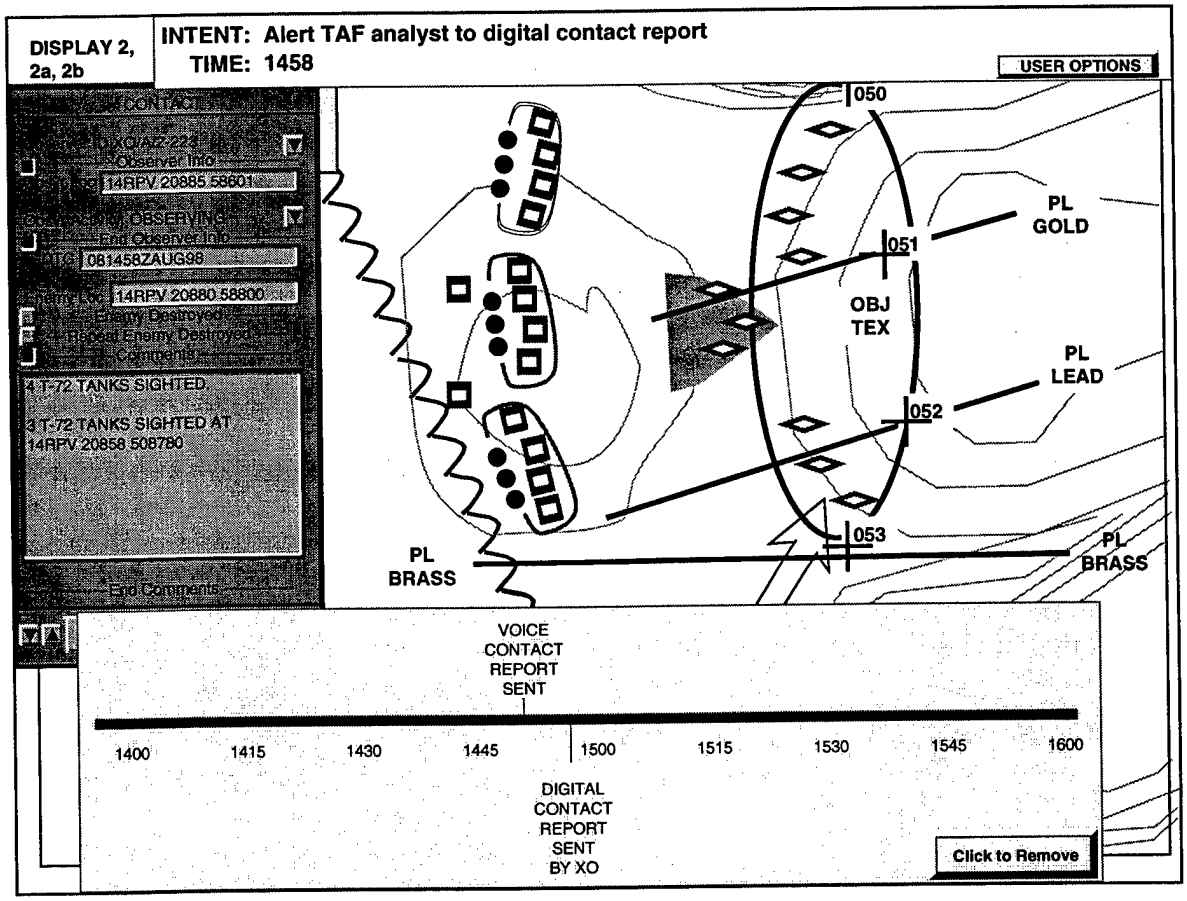
Reference: FKSM 17-15-3

TAF ANALYST/WORKSTATION ACTIONS. When the TAF analyst clicked on the **Contact Report** button, the TAF workstation time-tagged an animated view of the Co Tm's disposition, movement, firing activities and voice traffic. The workstation saved the computer-generated imagery and voice clip as an AAR aid in an aid bin. The TAF analyst may review the AAR aid during a lull in the exercise or upon exercise termination. To support the OCs introduction and discussion of the AAR aid, the workstation automatically produces the discussion points in Figure 14, less the information appearing under WHAT HAPPENED. The analyst fills in this information manually to tailor the discussion of the AAR aid to the training unit and the actual circumstances of the contact. The discussion points are for the OC's eyes only. If the training unit rendered a correctly formatted contact report, the analyst would discard the aid. In this scenario, the contact reports rendered within the Co Tm did not follow the correct format and the analyst retained the AAR aid for the OC's AAR.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Alert TAF analyst to digital contact report

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
CO/TM fire support overlay and contact report sent by XO to BN TF S-3.	**DISPLAY 2 :** *Snapshot Aid.* Show ground truth disposition and actions of friendly and enemy enitities over the CO/TM fire support overlay at the time the XO transmitted the digital contact report.	X	X	X	**DISPLAY 2a :** *FBCB2 Aid.* Show CO/TM XO contact report. Allow user to scroll through it. **DISPLAY 2b :** *Time Line.* Show timeline of events tagged by the user and the system. TRIGGER. System detects digital contact report transmitted by the CO/TM XO. **DISPLAY 2c :** *Table Aid.* Show digital message log of all messages transmitted or received by the CO/TM as the exercise progresses.	X	X	X



TAF ANALYST/WORKSTATION ACTIONS. The workstation senses the transmission of the contact report, automatically displays the report to the TAF analyst and time-tags the report on the timeline. (NOTE: The transmission of the digital contact report does not cause enemy icons to appear on all FBCB2 displays in the Bn TF. The Bn TF S2 must transmit an enemy overlay with the know enemy positions for the enemy icons to appear on FBCB2 screens in the Bn TF. However, this may not be the case for newer versions of FBCB2 software.)

SCENARIO. As the contact develops, the Co Tm XO transmits a digital contact report containing the information from the voice contact reports plus area grids for the sighted tanks to the Bn TF S3.

DISCUSSION POINTS FOR AAR DISPLAY 2

WHAT HAPPENED: (Trainer Entry)

Co Tm XO transmitted digital contact report to the Bn TF S3 responsively.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. How well did the digital contact report locate and describe OPFOR's actual dispositions?

2. Was the contact report timely enough to provide the remainder of the Co Tm and Bn TF a common picture of the enemy situation before the assault on the objective?

HOW TO IMPROVE: (System Entry)

1. The Co Tm XO eavesdrops on the Co Tm net and sends spot reports and situation updates by FBCB2 to the Bn TF Cdr and S3 to keep them apprised of the tactical situation.

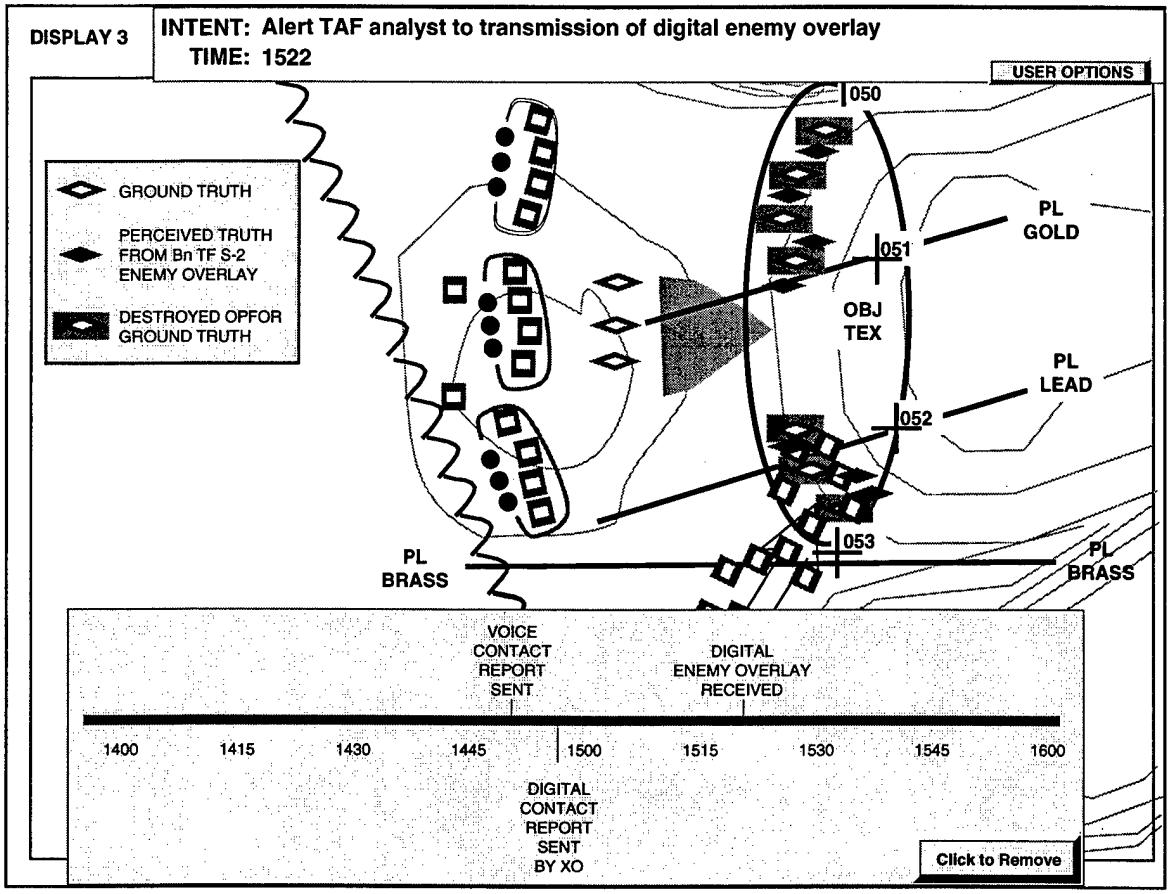
2. The Bn TF Cdr will have a very good picture of the tactical situation based on the situational enemy overlay, confirmed enemy icons, the contact report, and friendly unit symbology displayed on this FBCB2 system.

Reference: FKSM 71-1-1 (EXFOR)

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Alert TAF analyst to transmission of digital enemy overlay

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
CO/TM fire support overlay and Bn TF S2's enemy overlay.	**DISPLAY 3 :** *Snapshot Aid.* Show ground truth disposition and actions of friendly and enemy enitities with CO/TM fire support and enemy overlays at the time the Bn TF S2 transmitted the enemy overlay.	X	X	X	**DISPLAY 3a :** *Timeline.* Show timeline of events tagged by the user and the system. TRIGGER. System detects digital enemy overlay transmitted by the Bn TF S2. **DISPLAY 3b :** *Table Aid.* Show digital message log of all messages transmitted or received by the CO/TM as the exercise progresses.	X	X	X



TAF ANALYST/WORKSTATION ACTIONS. The workstation next senses the transmission of an updated enemy overlay transmitted by the Bn TF S2. The overlay displays enemy icons at the locations reported by the Co Tm XO.

SCENARIO. B Co Tm has just crossed PL LEAD and the command to lift and shift fires has been issued. The enemy overlay arrived at the same time the three enemy tanks were reported coming out of the dead space in front of RED Platoon causing WHITE Platoon to fire out of sector and believe there were more enemy attacking at PL LEAD.

DISCUSSION POINTS FOR AAR DISPLAY 3

WHAT HAPPENED: (Trainer Entry)

Bn TF S2 updated and transmitted digital enemy overlay with known enemy positions after the assault force initiated the assault on the objective.

FACILITATING QUESTIONS (WHY IT HAPPENED) : (System Entry)

1. How well did the Bn TF S2's enemy icons compare to actual OPFOR dispositions?

2. Was the Bn TF S2's update of known enemy locations timely enough to provide the remainder of the Co Tm and Bn TF a common picture of the enemy situation before the assault on the objective?

HOW TO IMPROVE: (System Entry)

1. The critical digital communication item is the updating of the enemy picture in FBCB2.

2. The ability to track the enemy, and to vector killers to defeat him, requires continuous observation of the enemy and frequent update of enemy icon locations by the Bn TF S2.

3. Digital reporting speeds comprehension of the tactical situation by reducing the need for clarification.

Reference: FKSM 71-2-1 (EXFOR)

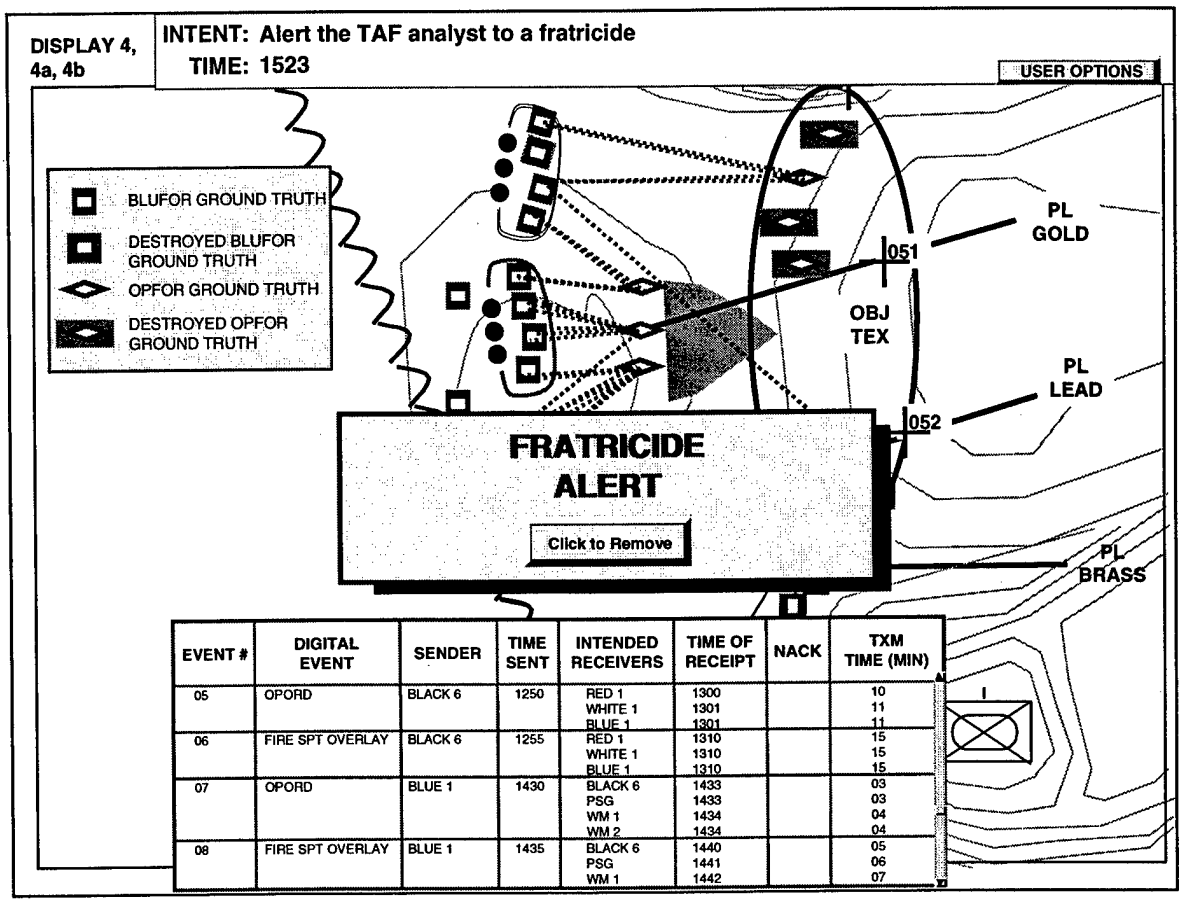
4. The enemy SA is received from the Bn TF ASAS-RWS. This supplies the CO/TM with near real-time enemy positioning. This knowledge will help to reduce friendly casualties.

Reference FKSM 71-1-1 (EXFOR)

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Alert TAF analyst to a fratricide

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
CO/TM fire support overlay.	**DISPLAY 4 :** *Plan View Aid.* Show ground truth disposition and direct fire vectors of friendly and enemy enitities over the CO/TM fire support overlay.	X			**DISPLAY 4a :** *Dialog Box.* Alert user that a fratricide has occurred. TRIGGER. System senses an engagement pairing of one BLUFOR vehicle engaging another BLUFOR vehicle. **DISPLAY 4b :** *Table Aid.* Show digital message log of all messages transmitted or received by the CO/TM as the exercise progresses.	X		



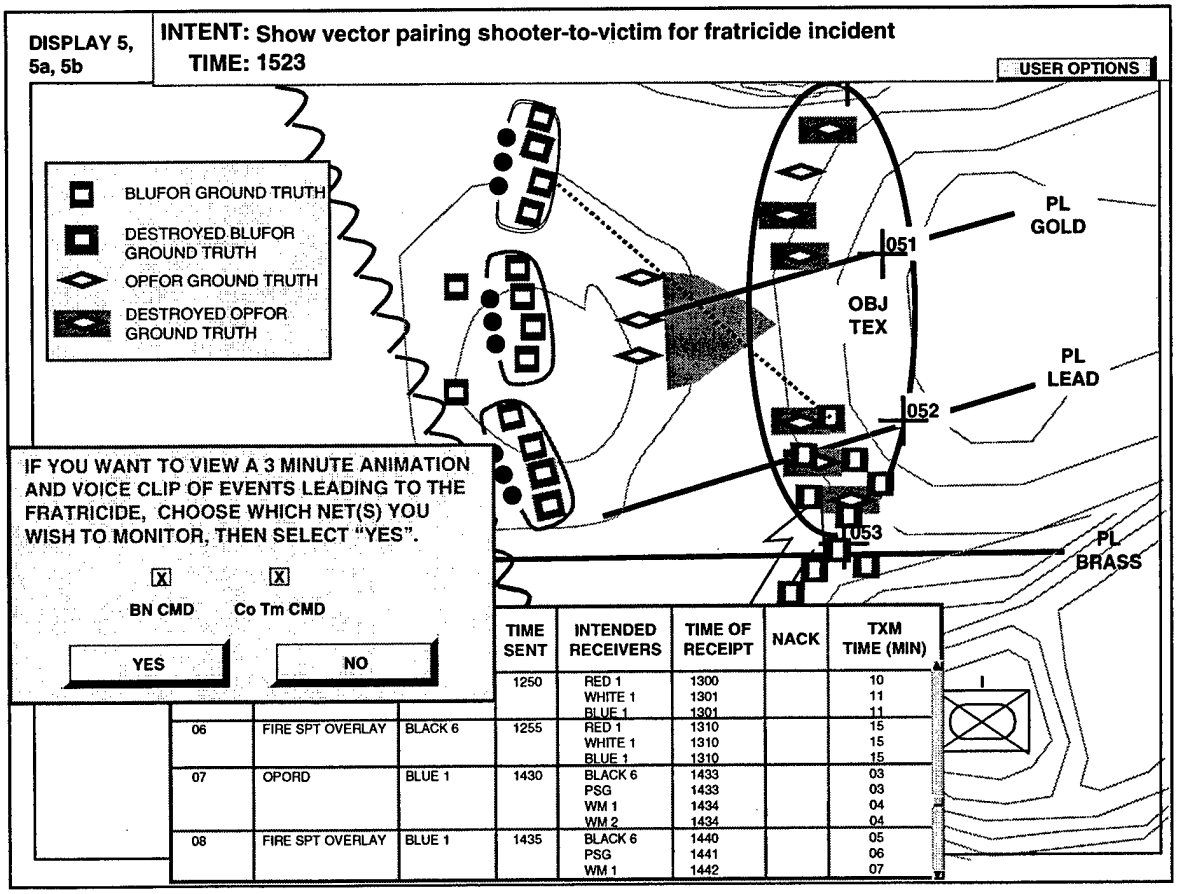
TAF ANALYST/WORKSTATION ACTIONS. The workstation senses a fratricide from an engagement pairing connecting two BLUFOR vehicles. Note that as the workstation monitors digital messages transmitted or received by a BLUFOR node(s) selected by the TAF analyst, the workstation adds the message to a digital message log. The TAF analyst may view the contents of any message by clicking on the **EVENT #.**

SCENARIO. In the excitement of the three OPFOR tanks coming out of the dead space and the new enemy overlay, WHITE Platoon causes a fratricide in B Co Tm.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show vector pairing of shooter-to-victim for fratricide incident

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
CO/TM fire support overlay.	**DISPLAY 5 :** *Snapshot Aid.* Show ground-truth disposition of friendly and enemy enitities over the CO/TM fire support overlay. Show shooter-to-victim pairing for fratricide incident.	X			**DISPLAY 5a :** *Dialog Box.* Asks the user if he would like to go back-in exercise history and view and hear a 3 minute animated replay of events prior to the fratricide. TRIGGER. System displays dialogue box 2 seconds after user removes fratricide alert dialogue box (Display 4a). **DISPLAY 5b :** *Table Aid.* Show digital message log of all messages transmitted or received by the CO/TM as the exercise progresses.	X		



TAF ANALYST/WORKSTATION ACTIONS. Following the fratricide the workstation presents a dialogue box to the TAF analyst asking him if he wishes to see a three minute replay of computer-generated graphics and tactical voice communications that occurred prior to the fratricide. The dialogue box also asks the analyst to designate which voice nets he wishes to monitor.

SCENARIO. The battle continues as the B Co Tm attempts to discover who is firing at them and taking evasive action.

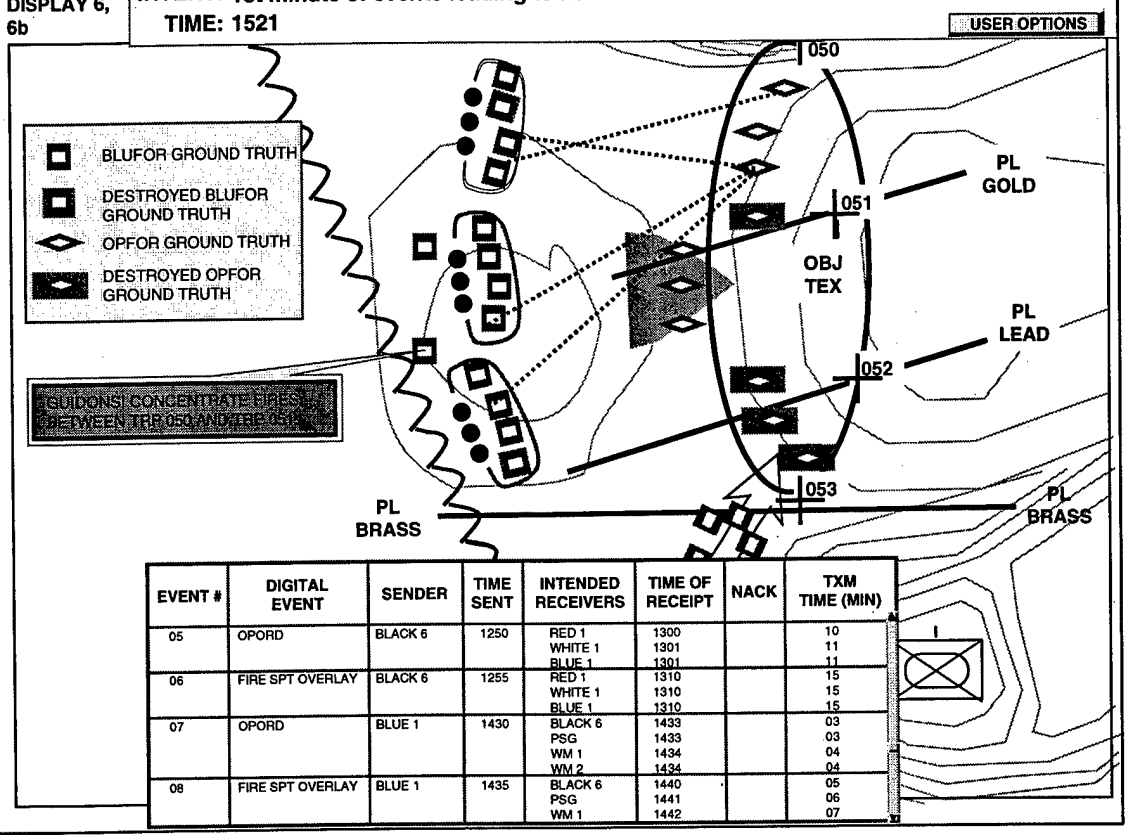
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show 3 minutes of events leading to fratricide								
FBCB2 DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
CO/TM fire support overlay.	**DISPLAY 6 :** *Plan View Aid.* 3-minute animated replay showing ground-truth disposition of friendly and enemy enitities, direct fire vectors and CO/TM fire support overlay. System synchronizes replay of voice communciations with the animation.		**X**	**X**	**DISPLAY 6a :** *Dialog Box.* Gives user option to see CO/TM fire support overlay and OPORD. TRIGGER. System displays dialogue box 2 seconds after the 3 minute audio/animation clip ends. **DISPLAY 6b :** *Table Aid.* Show digital message log of all messages transmitted or received by the CO/TM as the exercise progresses.		**X**	**X**

DISPLAY 6, 6b

INTENT: 1st minute of events leading to fratricide

TIME: 1521

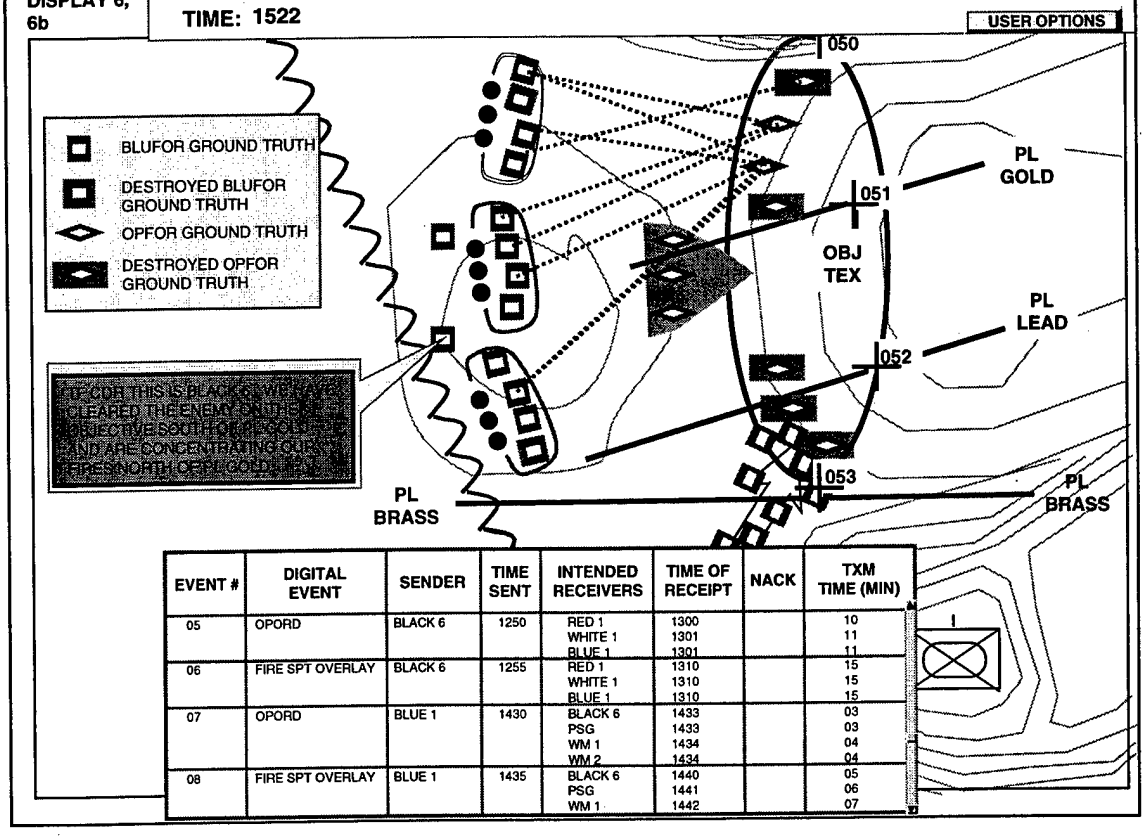


EVENT #	DIGITAL EVENT	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	TXM TIME (MIN)
05	OPORD	BLACK 6	1250	RED 1 WHITE 1 BLUE 1	1300 1301 1301		10 11 11
06	FIRE SPT OVERLAY	BLACK 6	1255	RED 1 WHITE 1 BLUE 1	1310 1310 1310		15 15 15
07	OPORD	BLUE 1	1430	BLACK 6 PSG WM 1 WM 2	1433 1433 1434 1434		03 03 04 04
08	FIRE SPT OVERLAY	BLUE 1	1435	BLACK 6 PSG WM 1	1440 1441 1442		05 06 07

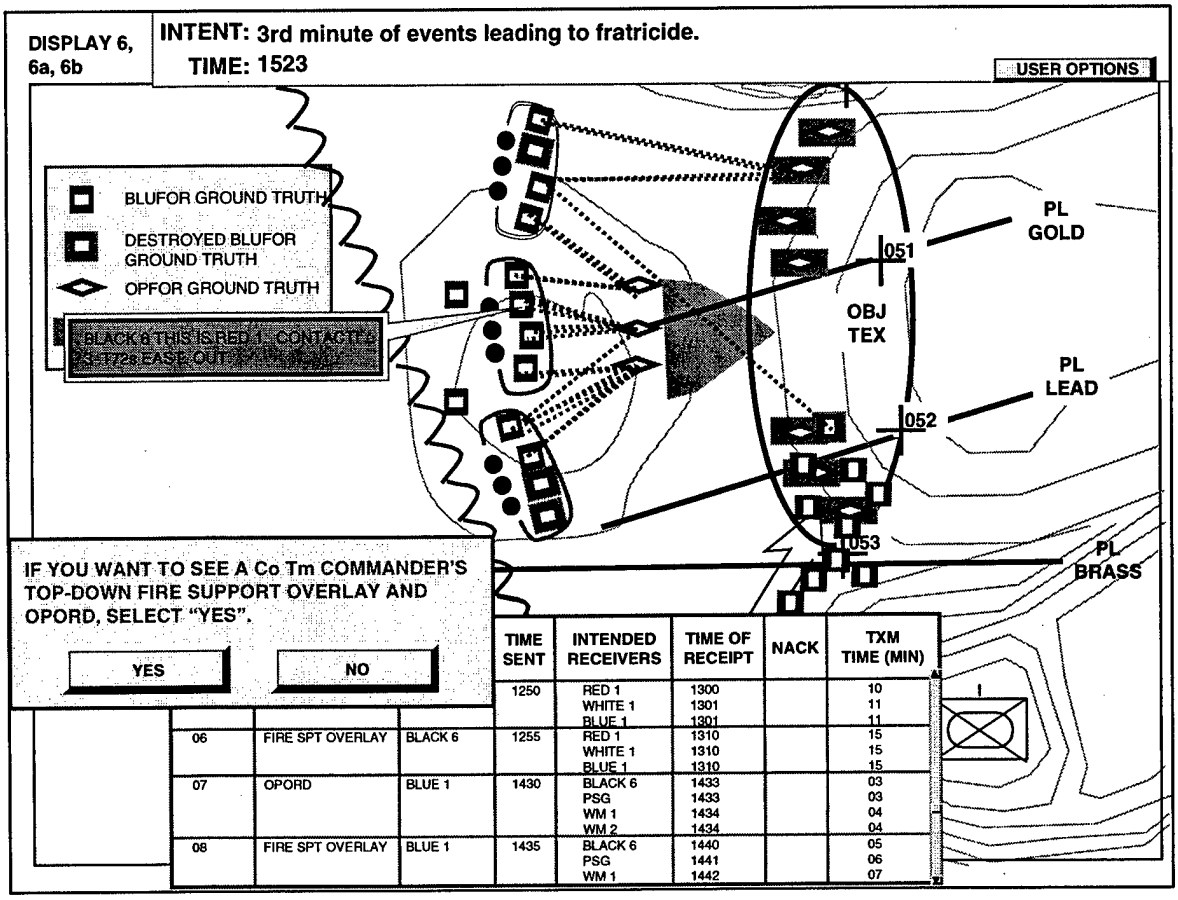
DISPLAY 6, 6b

INTENT: 2nd minute of events leading to fratricide

TIME: 1522



EVENT #	DIGITAL EVENT	SENDER	TIME SENT	INTENDED RECEIVERS	TIME OF RECEIPT	NACK	TXM TIME (MIN)
05	OPORD	BLACK 6	1250	RED 1 WHITE 1 BLUE 1	1300 1301 1301		10 11 11
06	FIRE SPT OVERLAY	BLACK 6	1255	RED 1 WHITE 1 BLUE 1	1310 1310 1310		15 15 15
07	OPORD	BLUE 1	1430	BLACK 6 PSG WM 1 WM 2	1433 1433 1434 1434		03 03 04 04
08	FIRE SPT OVERLAY	BLUE 1	1435	BLACK 6 PSG WM 1	1440 1441 1442		05 06 07



TAF ANALYST/WORKSTATION ACTIONS. At the end of the 3 minute animation of the battle prior to the fratricide, the workstation presents a dialog box to the TAF analyst asking if he wishes to view the Co Tm OPORD and top-down fire support overlay. The analyst clicks on the **YES** button and the next display appears.

SCENARIO. A Co Tm Cdr has issued a cease fire to WHITE Platoon after discovering they were the ones causing the fratricide. RED Platoon has been rendered combat ineffective by the the three OPFOR tanks that appeared out of the dead space. Two of the three OPFOR tanks are destroyed and the third is a mobility kill.

DISCUSSION POINTS FOR AAR DISPLAYS 5 & 6

WHAT HAPPENED: (Trainer Entry)

White 2 engages BLUFOR tank in assault force.

Background: Three minutes prior to the fratricide. Red 1 sent a contact report upon seeing enemy appear out of the dead space in front of his platoon. At that point White 2 engaged a BLUFOR tank in the assault force mistaking it for enemy.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. Was White 2's FBCB2 and BCIS operational?

2. What aspects of your risk assessment and terrain analysis addressed the factors that led to this fratricide?

HOW TO IMPROVE: (System Entry)

1. FBCB2 can assist in clearing fires by identifying friendly forces in the area, but cannot be the sole decision-making information source since there are friendly forces without FBCB2 and all systems may not be operational.

Reference: FKSM 71-2-1 (EXFOR)

2. Include fratricide risk as a key factor in terrain analysis (observation and fields of fire, cover and concealment, obstacles, key terrain, avenues of approach[OCOKA]).

Reference: FKSM 71-1-1 (EXFOR)

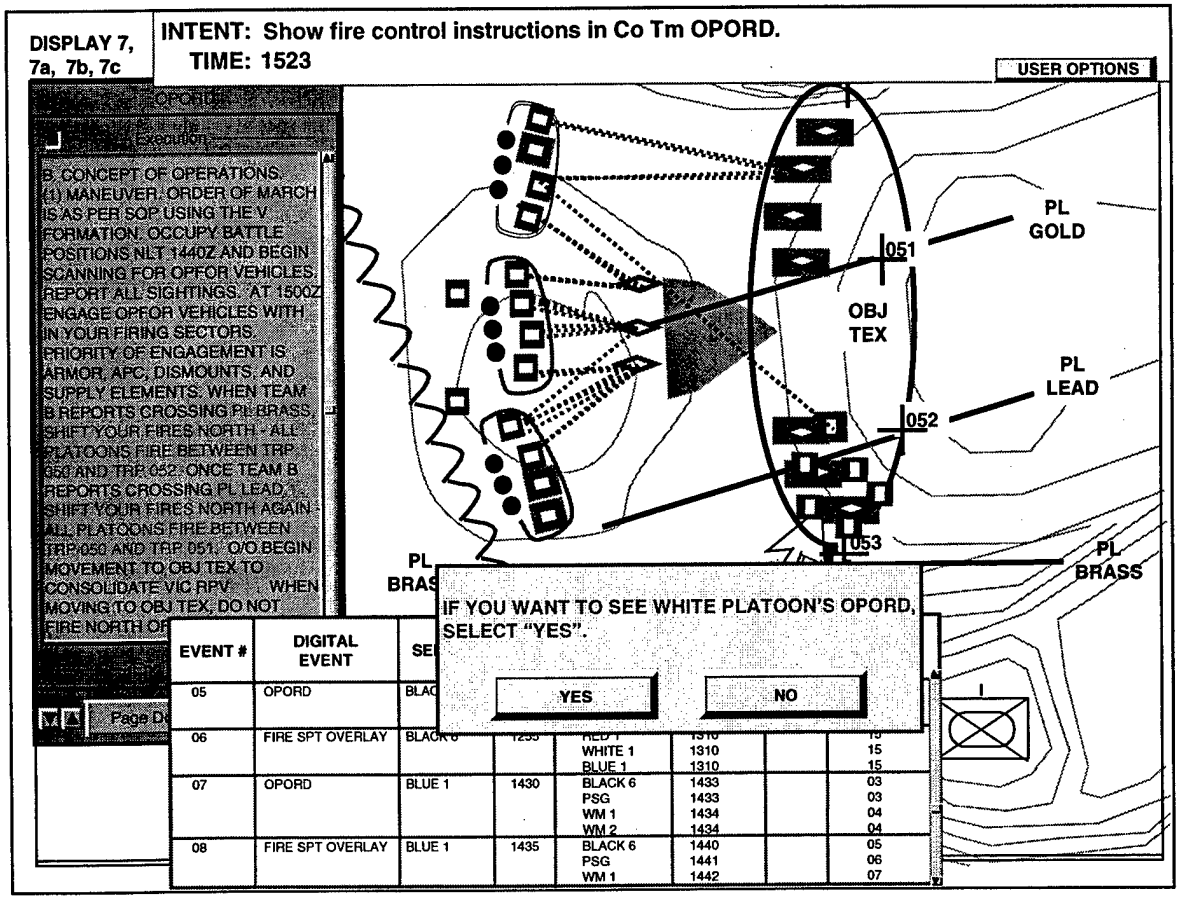
3. Eyes on the battlefield, cross-talk within the platoon. BCIS and FBCB2 are required to maintain SA.

Reference: Techniques practiced by other units that worked.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show fire control instructions in the CO/TM OPORD

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
CO/TM OPORD and fire support overlay.	**DISPLAY 7 :** *Snapshot Aid.* Show ground-truth disposition and direct fire vectors of friendly and enemy enitities over the CO/TM fire support overlay at the time of the fratricide.		**X**	**X**	**DISPLAY 7a :** *FBCB2 Aid.* Show CO/TM OPORD. Allow user to scroll through it. **DISPLAY 7b :** *Dialog Box.* Gives user option to see platoon OPORD. TRIGGER. System displays dialogue box 2 seconds after user indicates he wishes to see the CO/TM OPORD (Display 6a). **DISPLAY 7c :** *Table Aid.* Show digital message log of all messages transmitted or received by the CO/TM as the exercise progresses.		**X**	**X**



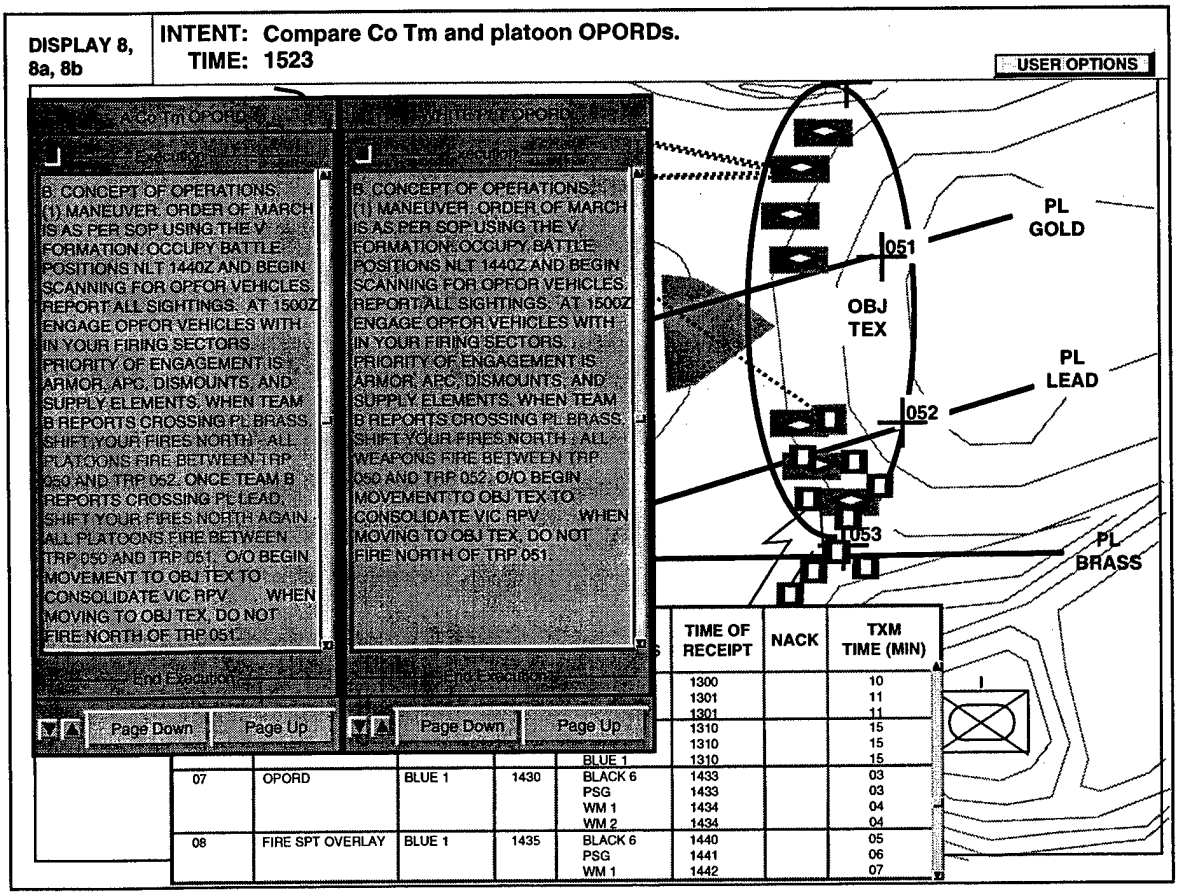
TAF ANALYST/WORKSTATION ACTIONS. The workstation displays the A Co Tm OPORD and top-down fire support overlay. Next, the workstations displays a dialog box asking if the analyst would like to compare the WHITE Platoon OPORD with the Co Tm OPORD. The analyst clicks on the **YES** button and the next display appears.

SCENARIO. B Co Tm has crossed PL GOLD allowing A Co Tm to leave their support-by-fire positions and move to the objective.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Compare CO/TM and platoon OPORDs

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
CO/TM OPORD, fire support overlay and platoon OPORD.	**DISPLAY 8 :** *Snapshot Aid.* Show ground-truth disposition and direct fire vectors of friendly and enemy enitities over the CO/TM fire support overlay at the time of the fratricide.		X	X	**DISPLAY 8a :** *FBCB2 Aid.* Show CO/TM and platoon OPORDs side-by-side. Allow user to scroll through both. TRIGGER: System displays both OPORDs after user indicates he wishes to view the white platoon leader's OPORD (Display 7b). **DISPLAY 8b :** *Table Aid.* Show digital message log of all messages transmitted or received by the CO/TM as the exercise progresses.		X	X



TAF ANALYST/WORKSTATION ACTIONS. The workstation displays the WHITE Platoon OPORD next to the A Co Tm OPORD and continues to show the Co Tm top-down fire support overlay. The analyst notes that the platoon OPORD does not address the shifting of fires at Phase Line (PL) LEAD as directed by the Co Tm OPORD. The analyst manually highlights the significant differences between the two OPORDs and saves the display as an AAR aid.

SCENARIO. A Co Tm is taking up a hasty defensive position in preparation for continued offensive operations within the next 12 to 24 hours.

DISCUSSION POINTS FOR AAR DISPLAYS 7 & 8

WHAT HAPPENED: (Trainer Entry)

White platoon leader's OPORD did not address the phased shifting of fires on the objective.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. Was this aspect of the operation addressed during the Co Tm back-brief?

2. Was this aspect of the operation covered during the Co Tm rehearsal?

HOW TO IMPROVE: (System Entry)

1. The back-brief is used by the commander to confirm that his intent and guidance for the conduct of the operation are clearly understood.

2. Rehearsals help to ensure leaders understand their roles and responsibilities in executing the Co Tm plan and conduct actions on the objective.

3. Prior to the actual mission, Co Tm leaders must ensure all unnecessary reports created during the rehearsal are deleted from their FBCB2 systems.

Reference: FKSM 71-1-1 (EXFOR)

APPENDIX F:
FORCE XXI BATTLE COMMAND BRIGADE AND BELOW (FBCB2) PLATOON TRAINING SCENARIO

The entries for FBCB2 PLATOON TASK MATRIX are taken from various sources. Information for the TASK and KEY ELEMENTS column is taken from Chapter 5 of FKSM 17-237-(EXFOR)-MTP Mission Training Plan for the EXFOR Digital Tank Platoon. Entries for the APPLICABLE TTP column were taken from FKSM 17-15-1 (EXFOR) Tank Platoon, FKSM 17-15-3 (EXFOR) Tank Platoon SOP, FKSM 71-1-1 (EXFOR) The Digitized Tank and Mechanized Infantry Company Team, and FKSM 71-2-1 (EXFOR) The Digitized Heavy Battalion. The input for the FBCB2 INPUT AND OUTPUT column came from the Force XXI - Appliqué Software User's Manual (SUM) for Version 1.0.1 of software.

The intent of each display illustrated in this appendix is stated below.

Display 1. INTENT: Show TAF analyst actions to filter digital messages by type and unit.

Display 2. INTENT: Show MEDEVAC request from PSG to 1SG and reconstitution timeline.

Display 3. INTENT: Alert TAF analyst to transmission of digital enemy overlay.

Display 4. INTENT: Show SITREP from PSG to 1SG and TAF analyst annotation for message tracking.

Display 5. INTENT: Show TAF analyst post LOGPAC arrival at platoon.

Display 6. INTENT: Call for support from PSG to 1SG requesting CLASS III resupply.

Display 7. INTENT: Show AAR aid - reconstitution timeline.

FBCB2 Platoon Task Matrix

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
Platoon sergeant coordinates LOGPAC support/activities with 1SG. (Conduct Resupply Operations 17-3-0601, FKSM 17-237-(EXFOR)-MTP, p. 5-84)	1. Verifies platoon's personnel, vehicle, equipment, fuel and ammunition status.	Each tank commander (TC) informs the platoon sergeant (PSG) of his personnel, vehicle, equipment, fuel and ammo status. He may do this face-to-face, FREE TEXT, or SITREP. The PSG consolidates the data, creates a SITREP and forwards it to the 1SG, sending a copy to the platoon leader.	If using the FBCB2 SITREP message, each TC will make entries to the following fields: Own Unit Name, Vehicle Status, Class III, Class V, Personnel and Comments. Comments are used to detail items listed above or to detail other areas not listed above.
Platoon sergeant coordinates LOGPAC support/activities with 1SG. (Conduct Resupply Operations 17-3-0601, FKSM 17-237-(EXFOR)-MTP, p. 5-84)	2. Submits specific resupply requests. NOTE: In FBCB2, use REPORTS: SITREP, PERSITREP, LOGSITREP and/or APPS: USER ADMIN: LOG Reporting or FREE TEXT if unit SOP dictates, for reporting through all levels in the chain of command to battalion task force level.	In the SITREP, the PSG states what specific needs, above what normally comes in the LOGPAC.	The following would be the selections used for a SITREP sent during consolidation/resupply; Own Unit Name, Vehicle Status, Class III, Class V, Personnel and any repeats necessary to cover the platoon. Comments are used to detail items needed in the LOGPAC that are not normally associated with a LOGPAC, are above and beyond normal LOGPAC functions or require larger quantities than is normally delivered in a standard LOGPAC.
Platoon sergeant coordinates LOGPAC support/activities with 1SG. (Conduct Resupply Operations 17-3-0601, FKSM 17-237-(EXFOR)-MTP, p. 5-84)	3. If tailgate resupply is appropriate, coordinates for linkup at designated contact point. Uses FBCB2 OVERLAYS and FREE TEXT.	SOP will dictate the type of resupply technique used. If enemy contact is not likely, the tailgate technique is appropriate. The 1SG will send an overlay showing where he will deliver the LOGPAC.	An overlay is a set or group of graphical objects displayed over the map on the SA display area. Overlays can be created by users via the Overlay create/edit functions or received as an Overlay message. After selecting the Create button from Overlays, the CSS button will be selected. Follow the prompts to create. After creating the overlay, the user must select the send button that causes the Transmission Settings template to appear. Precedence, acknowledgement, number of retries, Perishability DTG and Addressees for the overlay.

FBCB2 Platoon Task Matrix

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	AFATDS INPUT AND OUTPUT
Platoon sergeant coordinates LOGPAC support/activities with 1SG. (Conduct Resupply Operations 17-3-0601, FKSM 17-237-(EXFOR)-MTP, p. 5-84)	4. If service station resupply is appropriate, coordinates LOGPAC location and other resupply details using FBCB2 OVERLAYS and FREE TEXT as necessary.	SOP will dictate the type of resupply technique used. If enemy contact is not likely, the tailgate technique is appropriate. The 1SG will send an overlay showing where he will deliver the LOGPAC.	An overlay is a set or group of graphical objects displayed over the map on the SA display area. Overlays can be created by users via the Overlay create/edit functions or received as an Overlay message. After selecting the Create button from Overlays, the CSS button will be selected. Follow the prompts to create. After creating the overlay, the user must select the send button that causes the Transmission Settings template to appear. Precedence, acknowledgement, number of retries, Perishability DTG and Addressees for the overlay.

When creating the platoon scenario, we completed the C4I PERFORMANCE ASSESSMENT MATRICES after completing the aids. We found that, although the matrix would give you an idea of how the display might appear, it required numerous iterations; with every new idea for the display a revision of the matrix was necessary. We created the scenario, intent for the display, and the display at the same time - in words first, then in PowerPoint. Once in PowerPoint, we took the intent from the display and placed it at the top. Then we went from left to right, first describing what, if any FBCB2 information might be displayed. Next we looked to see what might be available from the analyst workstation and how we could properly name it. We described how the FBCB2 information would be displayed with the workstation information. In the supporting displays column we would describe, in as much detail as needed, the other parts of the display that enhanced it. Finally, we would judge whether, when and how the displays would be used - near real-time/ alert to user, show on user command, an AAR aid or any combination of the three.

CONVENTIONS: As you proceed through the scenario, you will view proposed displays to assist the training analyst monitor digital communications and assess BLUFOR performance. Below each display is a narrative which addresses the training

analyst's interactions with the TAF workstation as he observes BLUFOR digital actions and inactions during the exercise. We will use the conventions below in our narration of various display features and user interface functions as we discuss the trainers interaction with the displays.

BOLD text- represents analyst selection of an item (mouse click)

Italics - represents analyst-entered data

"Quotes" - represents names of dialog boxes

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TAF analyst actions to filter digital messages by type and unit.

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 1 :** *Plan View.* Show ground truth of CO/TM area of operation.		X		**DISPLAY 1a :** *Dialog Box.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. When the user needs to make a selection, he causes the menu to appear by selecting the USER OPTIONS button. When he wants the dialog box to disappear, he again clicks on the USER OPTIONS button.		X	

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TAF analyst actions to filter digital messages by type and unit. (CONTINUED)

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 1 :** *Plan View.* Show ground truth of CO/TM area of operation.		X		**DISPLAY 1b :** *Dialog Box.* Provides user the ability to filter specific message types and have the system automatically display them upon transmission/receipt. TRIGGER. When the user clicks on the MSG FILTER button, the dialog box appears.		X	

TAF ANALYST/WORKSTATION ACTIONS. As the platoon to be observed reaches its hasty defensive position, the TAF analyst makes his selection for the next phase of the exercise. He wants to monitor SITREPs and calls for support from Blue Platoon of A Co Tm. To get the vertical "USER OPTIONS" bar to expand, he must click on the **USER OPTIONS** button. He then selects the **MSG FILTER** button, causing the "MESSAGE FILTER" dialog box to appear, showing the types of messages he can filter. Selection also causes the actual message to appear on the screen when the workstation receives it. Next the analyst selects the unit(s) he wishes to monitor, clicking on one of the vehicles within the unit. Our example shows the analyst will be monitoring Blue Platoon's SITREPs and calls for support.

SCENARIO. A Co Tm has just completed a support-by-fire mission, has consolidated on the objective, and has taken up a hasty defensive position in anticipation of further offensive action within the next 12 to 24 hours.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show MEDEVAC request from PSG to 1SG and reconstitution timeline.

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
MEDEVAC request from PSG to 1SG.	**DISPLAY 2 :** *Plan View.* Show ground truth of CO/TM area of operation. Show MEDEVAC request on top of the plan view.	X	X		**DISPLAY 2a :** *Dialog Box.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. When the user needs to make a selection, he causes the menu to appear, clicking the USER OPTIONS button. When he wants the dialog box to disappear, he again clicks on the USER OPTIONS button.	X	X	

C4I PERFORMANCE ASSESSMENT MATRIX

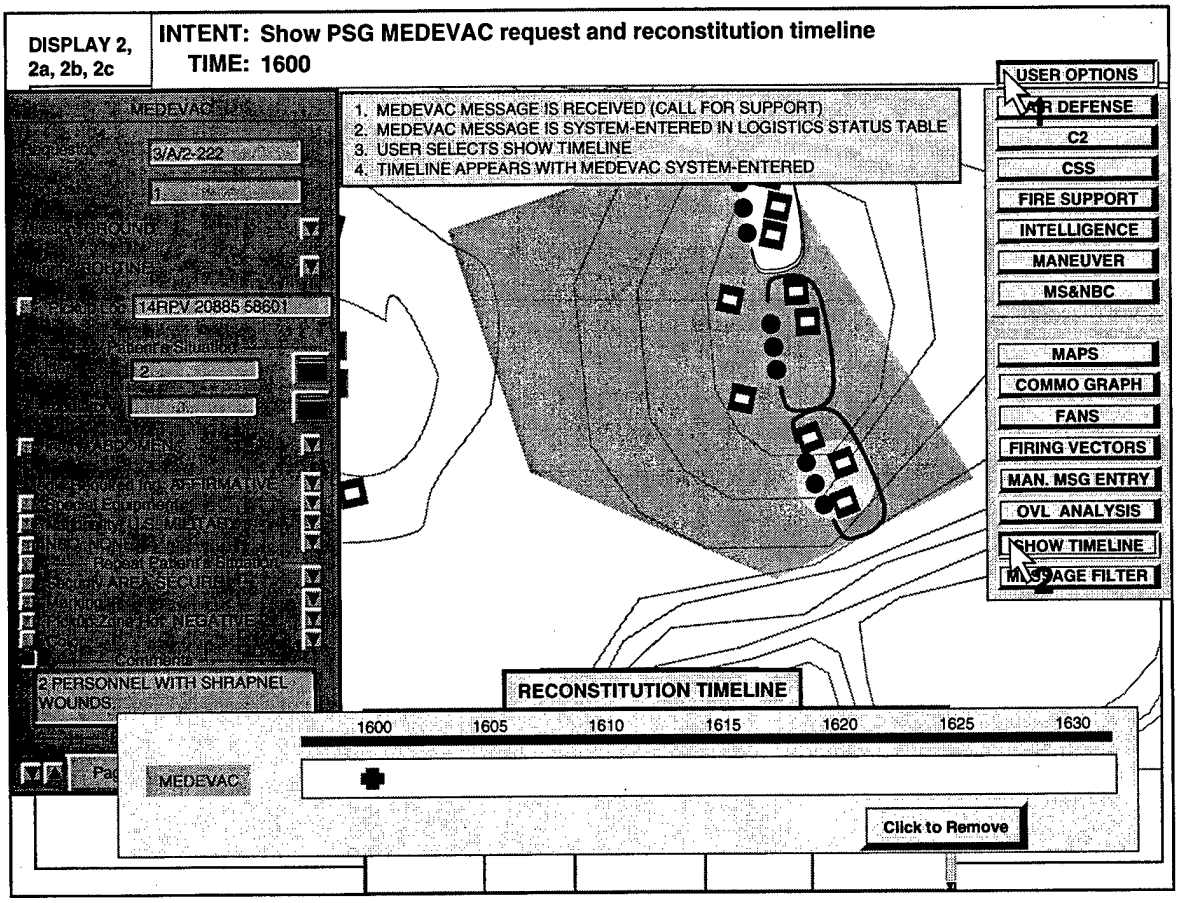
INTENT : Show MEDEVAC request from PSG to 1SG and reconstitution timeline. (CONTINUED)

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
MEDEVAC request from PSG to 1SG.	**DISPLAY 2 :** *Plan View.* Show ground truth of CO/TM area of operation. Show MEDEVAC request on top of the plan view.	X	X		**DISPLAY 2b :** *Table.* Shows each filtered message as it is transmitted and keeps a running log of the messages until the message filter selection is changed. TRIGGER. When the system senses the message is one to be filtered (correct unit and message type), it enters the unit sending the message, the symbol for the type of message sent (in this case a red cross) and the date-time-group (DTG) the message was sent. There is space for the request completion time and also for a green icon (a green cross in this case) indicating the request was fulfilled.	X	X	

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show MEDEVAC request from PSG to 1SG and reconstitution timeline. (CONTINUED)

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
MEDEVAC request from PSG to 1SG.	**DISPLAY 2 :** *Plan View.* Show ground truth of CO/TM area of operation. Show MEDEVAC request on top of the plan view.	X	X		**DISPLAY 2c :** *Timeline.* Graphically shows, in timeline format, when messages were sent (using a red supporting icon) and when requests were fulfilled (using a green supporting icon). The timeline will connect the two icons with a green line when the green icon is added. The line will remain red, however, until the request is fulfilled. TRIGGER. When the user clicks on SHOW TIMELINE button, the timeline (consisting of filtered messages from the selected unit) up to that point, will appear.	X	X	



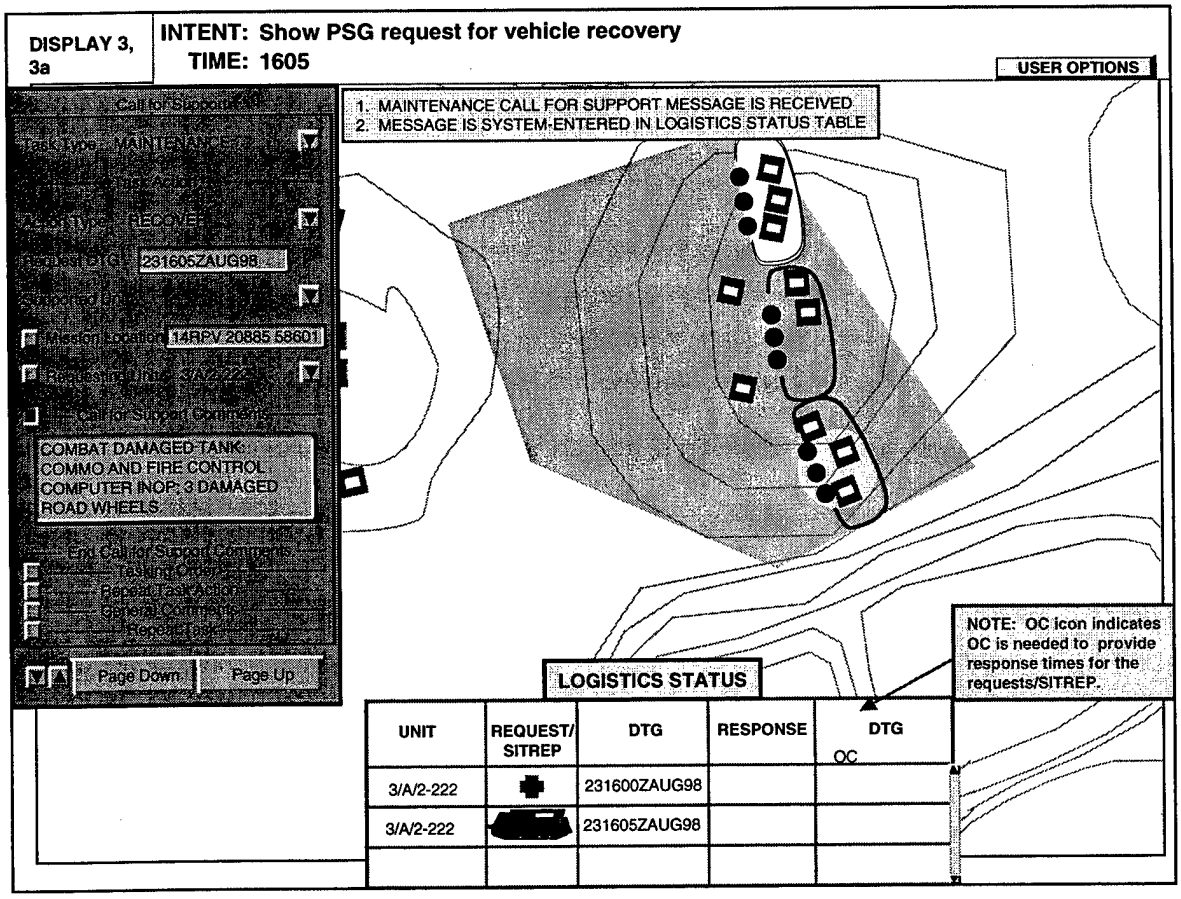
TAF ANALYST/WORKSTATION ACTIONS. At 1600Z, the workstation senses a message meeting the TAF analyst's criteria for filtering and displays it. It is a MEDEVAC request. As it appears on the screen, the workstation automatically places the originating unit's designation, an appropriate symbol for the message (here a red cross) and the date-time-group (DTG) of the message in the "Logistics Status" table. To ensure the reconstitution timeline is functioning, the analyst selects **USER OPTIONS** and the **TIMELINE** button. The reconstitution timeline appears with the type of message, displaying the symbol at the DTG of the message.

SCENARIO. As the platoon reaches its hasty defensive position, the platoon sergeant (PSG) is notified of two wounded personnel from tank 4. The PSG sends a MEDEVAC request to the 1SG using FBCB2, detailing the nature of the casualties and the precedence of the request.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show vehicle recovery request from PSG to 1SG.

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Vehicle recovery request from PSG to 1SG.	**DISPLAY 3 :** *Plan View.* Show ground truth of CO/TM area of operation. Show the vehicle recovery request on top of the plan view.	X	X		**DISPLAY 3a :** *Table.* Shows each filtered message as it is transmitted and keeps a running log of the messages until the message filter selection is changed. TRIGGER. When the system senses the message is one to be filtered (correct unit and message type), it enters the unit sending the message, the symbol for the type of message sent (a red M88 recovery vehicle in this case) and the DTG the message was sent. There is space for the request completion time and also for a green icon (a green M88 in this case) indicating the request was fulfilled.		X	



TAF ANALYST/WORKSTATION ACTIONS. At 1605Z, the workstation senses a filtered message from Blue Platoon and displays it on the screen. At the same time, the system places the originating unit, an M88 recovery vehicle (the workstation "knows" the message is a maintenance call for support and that the request is for recovery) and places the message DTG in the DTG box in the "Logistics Status" table. Now the analyst can see both messages and can refer back to them at any time during the current phase of action.

SCENARIO. Upon establishing security and the hasty defensive position, the PSG sends a maintenance call for support to the 1SG for recovery of Tank 4, damaged in the previous action. He details the damage and the exact location of the tank He also begins to cross level ammunition and other supplies among his three remaining tanks. As he does so he receives SITREPs from the tank commanders (TC).

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show SITREP from PSG to 1SG and TAF analyst annotation for message tracking.

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
SITREP from PSG to 1SG.	**DISPLAY 4 :** *Plan View.* Show ground truth of CO/TM area of operation. Show the SITREP on top of the plan view.	X	X		**DISPLAY 4a :** *Dialog Box.* Provides user capability to select various options within the system such as message filter, other maps, timelines, and manual message entry. TRIGGER. User sees a remark in the Comments portion of a message and decides to track that comment. (In this example, the PSG is also requesting company repair team (CRT) assistance and the TAF analyst wishes to track the request). He selects the USER OPTIONS button to reveal his options.		X	

C4I PERFORMANCE ASSESSMENT MATRIX

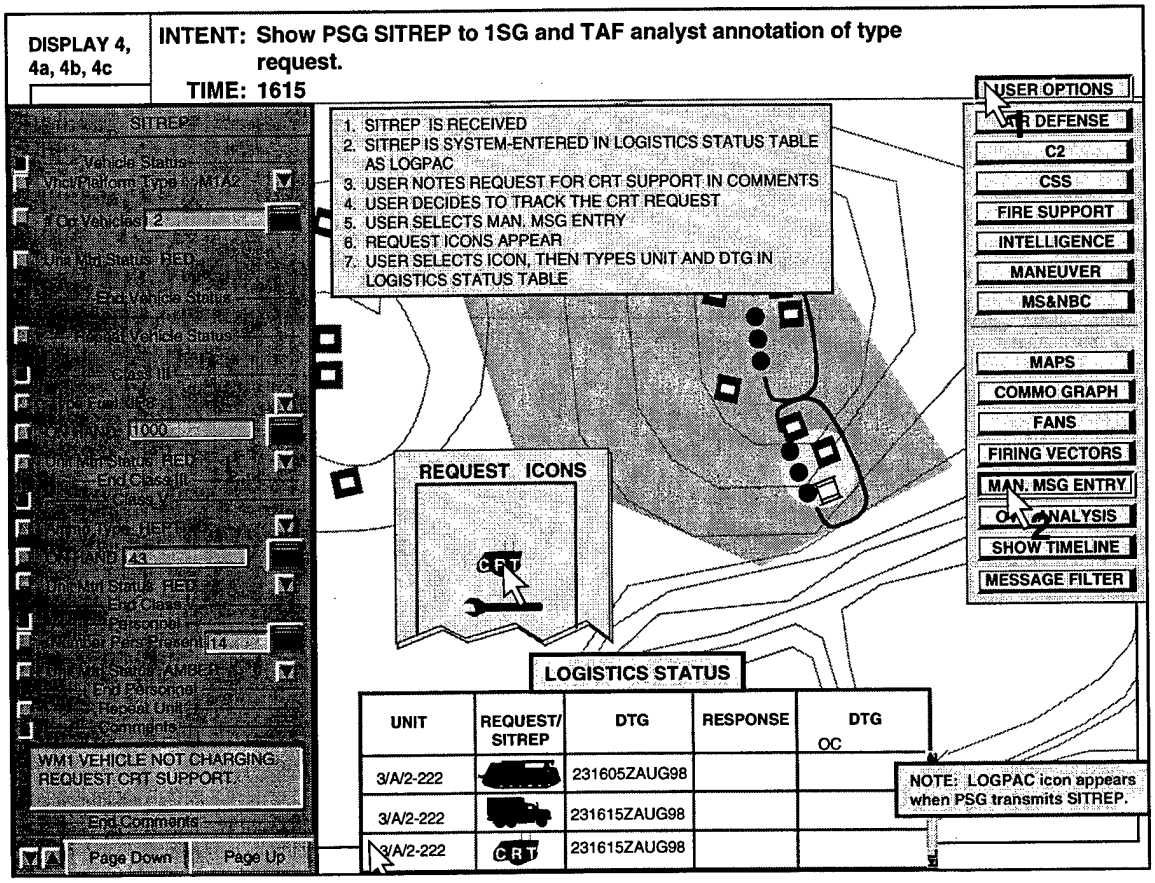
INTENT : Show SITREP from PSG to 1SG and TAF analyst annotation for message tracking. (CONTINUED)

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
SITREP from PSG to 1SG.	**DISPLAY 4 :** *Plan View.* Show ground truth of CO/TM area of operation. Show the SITREP on top of the plan view.	X	X		**DISPLAY 4b :** *Table.* Shows each filtered message as it is transmitted and keeps a running log of the messages until the message filter selection is changed. TRIGGER. When the system senses the message is one to be filtered (correct unit and message type), it enters the unit sending the message, the symbol for the type of message sent (a red 2 1/2 ton in this case) and the DTG the message was sent. There is space for the request completion time and also for a green icon indicating the request was fulfilled. The system assigns a 2 1/2 ton truck to the SITREP because during this phase of operations, a SITREP is used as an indication the unit is ready for its LOGPAC.	X	X	

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show SITREP from PSG to 1SG and TAF analyst annotation for message tracking. (CONTINUED)

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
SITREP from PSG to 1SG.	**DISPLAY 4 :** *Plan View.* Show ground truth of CO/TM area of operation. Show the SITREP on top of the plan view.	X	X		**DISPLAY 4c :** *Dialog Box.* Allows the user to select from a number of icons to represent the request he wishes to follow to completion. TRIGGER. When the user selects the MAN. MSG ENTRY button, the icon selection appears. In this example, since the request the user wishes to track is for CRT, he selects the CRT vehicle and it appears in the table. The user then types in the originating unit and the DTG the message was received.		X	



TAF ANALYST/WORKSTATION ACTIONS. At 1615Z, the workstation senses a message meeting the analyst's criteria for filtering and displays it. It is a SITREP. As it appears on the screen, the workstation automatically places the originating unit's designation, an appropriate symbol for the message (here a red 2 1/2 ton truck) and the message DTG in the Logistics Status table. The workstation "knows" that a SITREP at this phase of the battle will mean a LOGPAC request, therefore it uses the 2 1/2 ton truck. As the analyst reads the SITREP, he notices in the Comments a request for combat repair team support for a tank not charging. The analyst decides to track this request and selects **USER OPTIONS** and **MAN. MSG ENTRY** buttons. Upon selection, the workstation displays available request icons he may use to identify the message he wants to track. Since it is a CRT request, he picks the M113 CRT symbol by clicking on it. This action causes the symbol to appear in the next available blank in the "REQUEST/SITREP" column. The user then types the *originating unit designation and the DTG* of the SITREP.

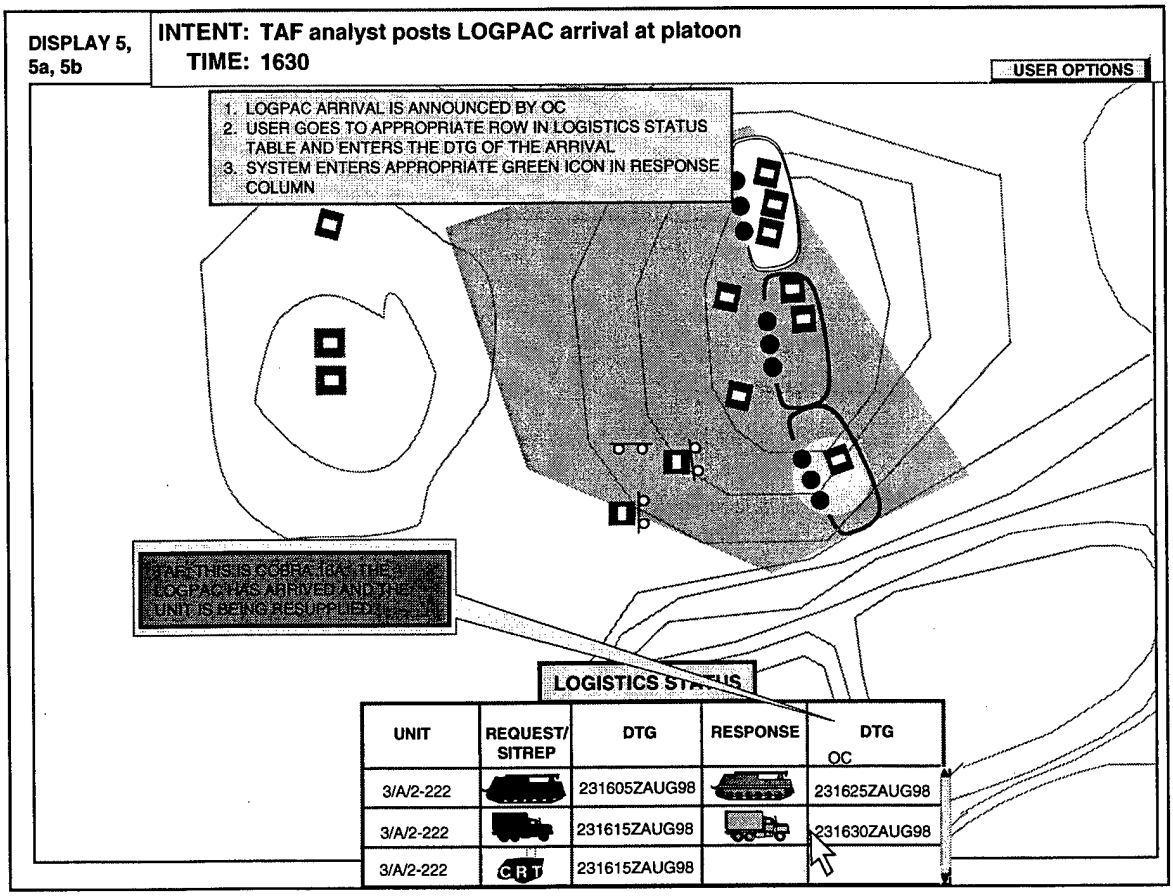
SCENARIO. The PSG consolidates the SITREPs he has just received from his TCs and creates a SITREP in FBCB2. He details

his personnel, vehicle, Class III and V status. In the Comments section, he tells the 1SG Tank 1 is not charging and requests combat repair team (CRT) support. The PSG understands as soon as he sends the SITREP the 1SG knows his platoon is ready for resupply.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show TAF analyst post LOGPAC arrival at platoon.

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 5 :** *Plan View.* Show ground truth of CO/TM area of operation.		X		**DISPLAY 5a :** *Table.* Shows each filtered message as it is transmitted and keeps a running log of the messages until the message filter selection is changed. TRIGGER. When the OC reports a tracked action has been completed, the user manually enters the DTG the OC stated in his message. Upon completing the DTG, the system assigns a green companion icon to the red one entered when the associated digital message was received. In this case, a green 2 1/2 ton truck is entered by the system after the user has entered the response DTG.	X	X	



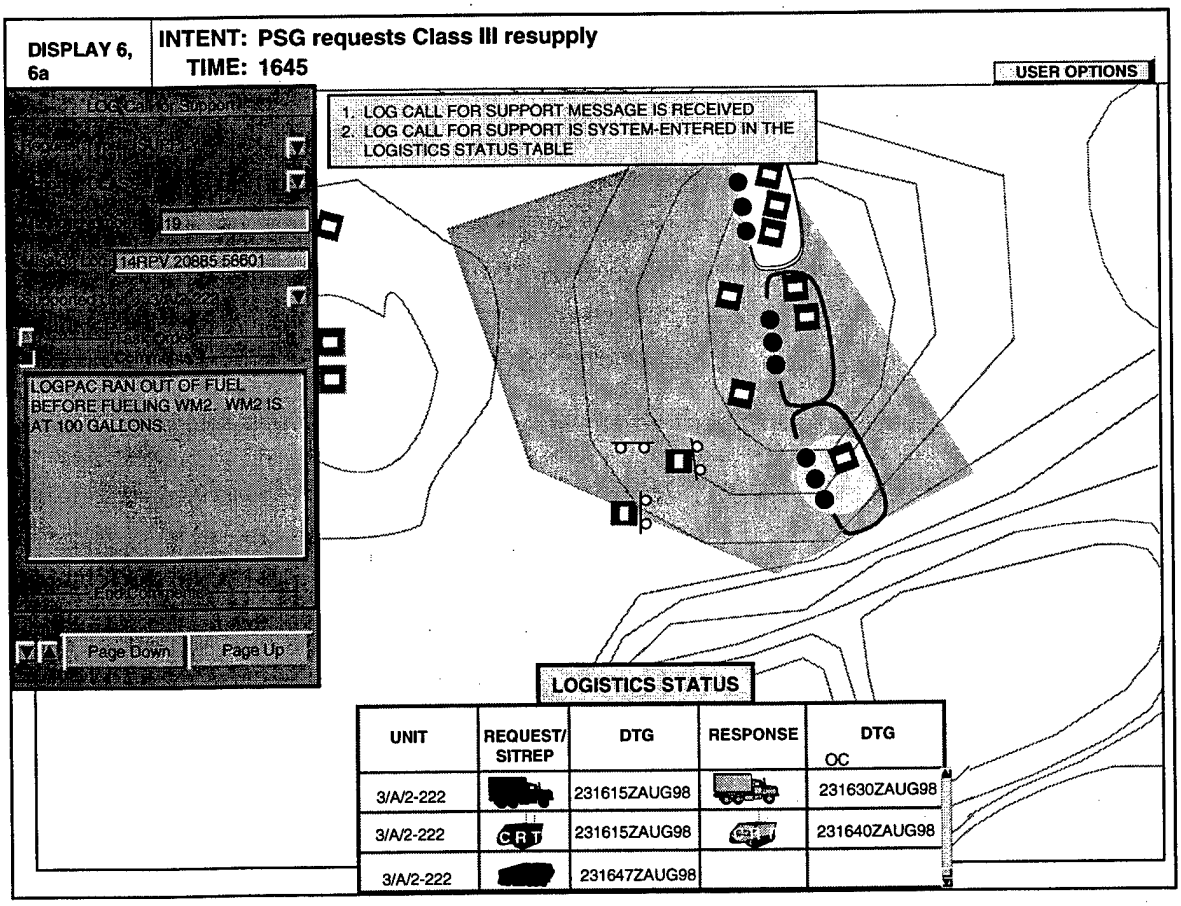
TAF ANALYST/WORKSTATION ACTIONS. At 1630Z the OC for the Co Tm calls the TAF analyst and says the unit is beginning to go through the LOGPAC. Since this was a message recorded in the Logistics Status table, the analyst wishes to enter the DTG for the message. He finds the entry for the LOGPAC (the red 2 1/2 ton) and goes across to the "DTG" column in the LOGPAC row and types the *DTG*. After the analyst types the *DTG*, the workstation automatically places a green 2 1/2 ton truck in the Response column to indicate the message has received a response.

SCENARIO. The LOGPAC has just arrived at the Co Tm. Blue Platoon is the last platoon to go through the LOGPAC.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Call for support from PSG to 1SG requesting CLASS III resupply.

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
Call for support from PSG to 1SG requesting CLASS III resupply.	**DISPLAY 6 :** *Plan View.* Show ground truth of CO/TM area of operation. Show the call for support over the plan view.	X	X		**DISPLAY 6a :** *Table.* Shows each filtered message as it is transmitted and keeps a running log of the messages until the message filter selection is changed. TRIGGER. When the system senses the message is one to be filtered (correct unit and message type), it enters the unit sending the message, the symbol for the type of message sent (in this case a POL tanker) and the DTG the message was sent. There is space for the request completion time and a green icon indicating the request was fulfilled.	X	X	



TAF ANALYST/WORKSTATION ACTIONS. At 1647Z the workstation senses a message meeting the analyst's criteria for filtering and displays it. It is a LOG Call for Support for Class III. As it appears on the screen, the workstation automatically places the originating unit's designation, an appropriate symbol for the message (since it is Class III, the POL tanker is selected) and the DTG of the message in the Logistics Status table. The analyst reads the Comments and notes Tank 1 is low on fuel and did not get refueled at the LOGPAC. He also knows the unit is due to continue the attack at 0500Z the next morning and will be interested to see if the tank gets the fuel in time.

SCENARIO. Blue Platoon has just completed the LOGPAC but Tank 1 did not get refueled and only has 100 gallons. The PSG sends a LOG Call for Support for Class III to the 1SG who had left the LOGPAC prior to Blue Platoon completing the resupply.

C4I PERFORMANCE ASSESSMENT MATRIX

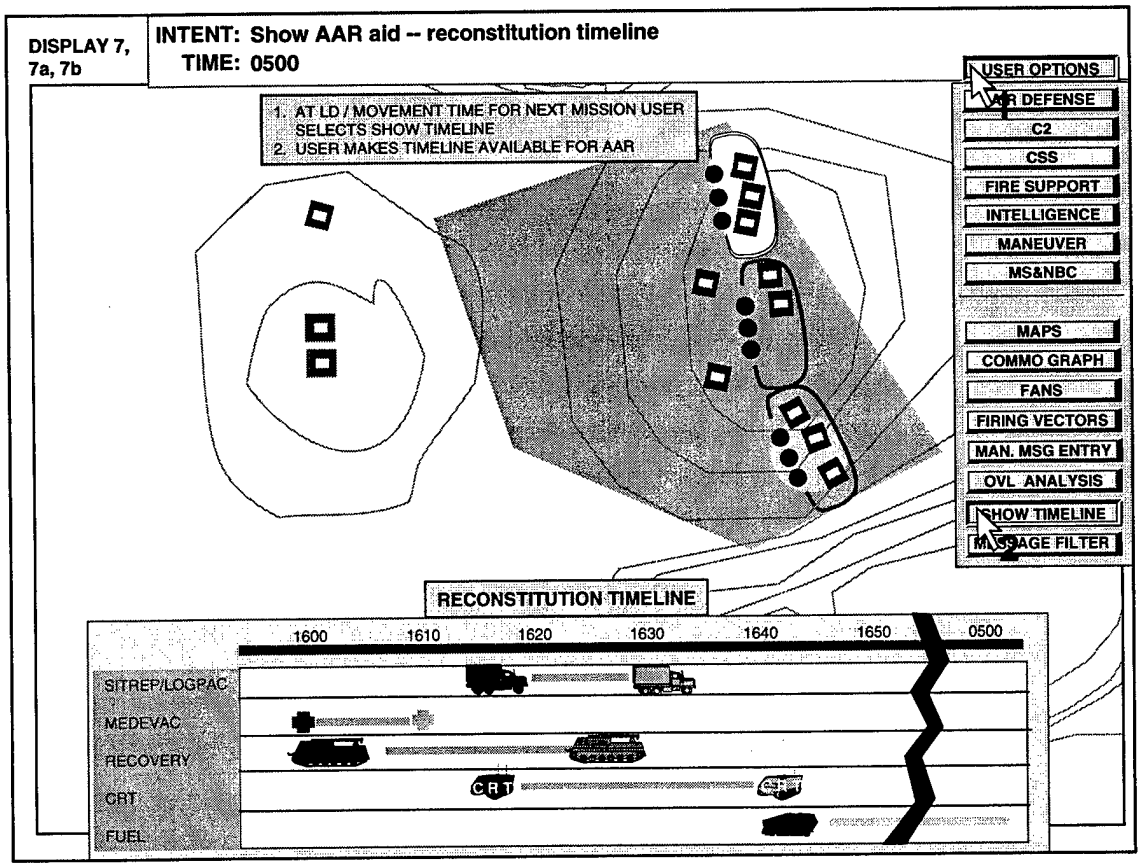
INTENT : Show AAR aid - reconstitution timeline.

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 7 :** *Plan View.* Show ground truth of CO/TM area of operation.		**X**		**DISPLAY 7a :** *Table.* Shows each filtered message as it is transmitted and keeps a running log of the messages until the message filter selection is changed. TRIGGER. NONE. Table is already visible and no new entries are made during this display.		**X**	

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT : Show AAR aid - reconstitution timeline. (CONTINUED)

FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 7 :** *Plan View.* Show ground truth of CO/TM area of operation.		X		**DISPLAY7b :** *Timeline Aid.* Graphically shows, in timeline format, when messages were sent (using a red supporting icon) and when requests were fulfilled (using a green supporting icon). The timeline will connect the two icons with a green line when the green icon is added. The line will remain red, however, until the request is fulfilled. TRIGGER. When user clicks on SHOW TIMELINE button, the timeline up to that point in time, will appear.		X	X



TAF ANALYST/WORKSTATION ACTIONS. Since it is SP time, the TAF analyst decides to make the AAR aid for this consolidation/

reconstitution phase of the exercise. He notes all messages have green icons and lines associated with the exception of the FUEL message. He notes the red line did not change color and there is no green icon paired with it. As he makes the timeline, the workstation creates the AAR Discussion Points.

SCENARIO. The Co Tm has an SP time of 0500Z. Tank 1 of BLUE Platoon still has not received the requested POL. Tank 1 will not be able to participate in the ensuing operation due to low fuel. The tank recovered the day before was repaired and returned with a new crew. BLUE Platoon will participate in the operation one tank short.

DISCUSSION POINTS FOR AAR DISPLAY 7

WHAT HAPPENED: (Trainer Entry)

Response times for each of the requests, with the exception of fuel, was adequate. All other supply categories were satisfactorily filled, giving the unit another 24 hours of supplies on which to operate. SP for the unit was 0500. Due to the lack of fuel for WM 2 of Blue Platoon, the platoon had to execute the new mission with only 2 M1A2s.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. How much fuel was brought in the LOGPAC?

2. Were there any problems with the accuracy of the SITREPs concerning fuel?

HOW TO IMPROVE: (System Entry)

The Co Tm LOGPAC has company, FSC and FSB assets that transport supplies to the Co Tm. LOGPAC has two fuel tankers, two ammo haulers, tool truck and trailer, prescribed load list (PLL) truck and trailer and supply truck (supplies & rations) and water trailer. The LOGPAC can sustain the Co Tm for a specific period, usually 24 hours. Replacements and hospital returnees get to Co Tm locations via LOGPAC vehicles. Parts may be moved forward to the Combat Repair Team (CRT) location during LOGPAC operations. The Co Tm will move EPWs using the back-haul capabilities of the LOGPAC. The Co Tm 1SG or representative meets the LOGPAC, guiding it to the resupply point. The Co Tm executes tailgate or service station resupply. Continuing the mission is not delayed to conduct service support operations or to wait for a LOGPAC, unless the unit is incapable of further action.

Request immediate resupply using an FBCB2 CFS for Class III/V through the 1SG to the support operations section of the FSC.

Service station resupply can normally be completed between 60 and 90 minutes.

Reference: FKSM 17-15-1 (EXFOR), FKSM 71-1-1 (EXFOR), FKSM 71-2-1 (EXFOR), FM 71-1

TAF ANALYST/WORKSTATION ACTIONS. The analyst completes the WHAT HAPPENED portion of the DISCUSSION POINTS FOR AAR DISPLAY 7. The workstation "knows" the red line was associated with Class III and searches its database to find questions relating to Class III resupply. It also goes through the database to find HOW TO IMPROVE and places related entries in this portion of the aid. The analyst has the ability to add/modify/ delete questions and add/modify/delete HOW TO IMPROVE comments entered automatically by the workstation.

APPENDIX G:
FORCE XXI BATTLE COMMAND BRIGADE AND BELOW (FBCB2) AIR DEFENSE ARTILLERY PLATOON TRAINING SCENARIO

We used various sources for completing the ADA PLATOON TASK MATRIX. We found information for the TASK and KEY ELEMENTS column in Chapter 5 of FKSM 71-2-1-(EXFOR), *MTP Mission Training Plan for the EXFOR Digitized Tank and Mechanized Infantry Battalion Task Force*. We used FM 44-43, *The BSFV Platoon,* to complete the APPLICABLE TTP column. We completed the AFATDS INPUT AND OUTPUT column with information taken from FKSM 71-2-1-(EXFOR), *MTP Mission Training Plan for the EXFOR Digitized Tank and Mechanized Infantry Battalion Task Force* and FM 44-43, *The BSFV Platoon.*

The intent of each of the displays illustrated in this appendix is stated below.

Display 1. INTENT: Show workstation capability to display Operations Overlay (MCS) and Intelligence Overlay (ASAS).

Display 2. INTENT: Show workstation capability to filter overlays.

Display 3. INTENT: Show workstation capability to evaluate reporting of enemy air and to display SHTU data.

Display 4. INTENT: Show workstation capability to analyze employment of weapons systems.

Display 5. INTENT: Show workstation capability to depict results of not killing an OPFOR aircraft at the farthest range.

Display 6. INTENT: Show workstation capability to alert analyst to mutual support violations.

Display 7. INTENT: Show workstation capability to alert analyst to the beginning of an air engagement.

Display 8. INTENT: Show workstation capability to create kill ratio AAR aid.

ADA Platoon Task Matrix

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	SHTU/FBCB2 INPUT/OUTPUT
PERFORM AIR DEFENSE OPERATIONS (7-1-3911) (Bn TF commander and staff develop plans to include active and passive air defense measures commensurate with the threat.) FKSM 71-2-1-(EXFOR)-MTP, pg. 5-99.	1.a. Identify, annotate, and disseminate all air avenues of approach in FBCB2 OVERLAYS.	Enemy air avenues and corresponding air named areas of interest (NAIs) must be depicted on the TF Intelligence Overlay. FM 44-43. pg. 2-2.	The ADA platoon leader (Air Defense Officer [ADO]), assists the Bn TF S2 in the development of the air intelligence preparation of the battlefield. FM 44-43. pg. 2-2.
PERFORM AIR DEFENSE OPERATIONS (7-1-3911) (Bn TF staff and leaders disseminate enemy air approaches, air defense status, and weapons control status.) FKSM 71-2-1-(EXFOR)-MTP, pg. 5-99.	2.a. Use FBCB2 to maximize information management and minimize electronic signature. b. Ensure all crews/ squads know enemy air avenues identified by the Bn TF S2/ADO, air defense warnings (RED, YELLOW, WHITE), and weapons control status (WEAPONS HOLD, WEAPONS TIGHT, and WEAPONS FREE).	ADO sends air defense warnings to the Bn TF S3 for dissemination to the Bn TF and to his ADA sections. The ADO also ensures his sections have received the Bn TF Intelligence Overlay, including the enemy air avenues of approach and NAIs. FM 44-43, pp. 2-2 – 2-3.	
PERFORM AIR DEFENSE OPERATIONS (7-1-3911) (Air defense weapons cover the Bn TF elements.) FKSM 71-2-1-(EXFOR)-MTP, pg. 5-100.	4.a. Cover critical, vulnerable Bn TF elements continuously by ADA weapons.	Fire units must be positioned so they are capable of engaging enemy air platforms before they can release their ordnance on, or gain intelligence about, friendly forces. With the mobility of the Linebacker, fire units should be located well forward and integrated into the supported task force scheme of maneuver. Depth is achieved by positioning fire units so threat air platforms encounter a countinuous volume of fire as they approach the protected force and or asset. The planning range for mutual support for Stinger systems is approximately 2,000m. The planning range of overlapping fires for Stinger systems is approximately 4,000m. pp. 2-7 – 2-8.	

ADA Platoon Task Matrix (Continued)

TASK (TASK STEP)	KEY ELEMENTS	APPLICABLE TTP	SHTU/FBCB2 INPUT/OUTPUT
PERFORM AIR DEFENSE OPERATIONS (7-1-3911) (Bn TF reacts to RED air defense warning.) FKSM 71-2-1-(EXFOR)-MTP, pg. 5-100.	5.a. Ensures that within three minutes, passive measures are increased and Air Defense crews are out and scanning.	The air battle management operations center (ABMOC) and Army airspace command and control (A2C2) elements receive track data simultaneously from the airborne warning and control system (AWACS). The sensors correlate that information with their own local track data (lightweight and special division interim sensor (LSDIS) with a 20-kilometer detection range and ground-based sensor (GBS) with a 40-kilometer detection range) and send it to the Linebacker platoon. FM 43-44, pg. E-1	The simplified hand-held terminal unit (SHTU) enhances early warning and engagement and is located at all ADA fire units including the ADA platoon. FKSM 71-2-1 (EXFOR).
PERFORM AIR DEFENSE OPERATIONS (7-1-3911) (Bn TF reacts to RED air defense warning.) FKSM 71-2-1-(EXFOR)-MTP, pg. 5-100.	5.a. Ensures that within three minutes, passive measures are increased and Air Defense crews are out and scanning. (Continued)	Early warning dissemination using EPLRS does not require LOS alignment. EPLRS also provides the capability to net sensors with the ABMOC and A2C2 elements. This network facilitates sharing track data and graphics digitally at all echelons. FM 43-44, pg. E-1	It enables the fire units to receive early warning (40km out) air tracks (data) from the sensor, whom in turn receives external air tracks (data) from the ABMOC, the sensor correlates external (ABMOC) track data with its own local data, and broadcasts that data to its air defense battery, platoons, sections, fire units, and brigade air defense LNOs. FKSM 71-2-1 (EXFOR).
PERFORM AIR DEFENSE OPERATIONS (7-1-3911) (Bn TF reacts to enemy air attacks.) FKSM 71-2-1-(EXFOR)-MTP, pg. 5-100.	6.a. Disseminates warning within one minute of enemy aircraft beginning engagement or observed entry into Bn TF sector.	The Linebacker platoon leader should transmit a local air defense warning (LADW) message over both the maneuver force command net and the platoon net: "Dynamite! Dynamite! (type aircraft) from the (direction) against (what element or graphical control measure)!" Dynamite is the LADW that alerts the maneuver force of an attack; the response, according to local SOP should be immediate. FM 44-43, pg. 2-9.	

We developed the ADA scenario based on the tasks and TTP in the preceding Task Matrix. Following scenario development, we described displays to support the assessment of BLUFOR's employment of the ADA platoon for mission planning and execution using the C4I Performance Assessment Matrix shown above. Next, we illustrated displays of each trainer alert and AAR aid. As we completed a set of displays, we updated the C4I Performance Assessment Matrix to describe the functionality that produced the displays and presentation timing. We developed separate illustrations with accompanying narrations to guide the reader through the scenario.

CONVENTIONS: As you proceed through the ADA scenario, you will view proposed displays to assist the training analyst in monitoring digital communications and assessing BLUFOR performance. Below each display is a narrative which addresses the training analyst's interactions with the TAF workstation as he observes BLUFOR digital actions and inactions during the exercise. We will use the conventions below in our narration of various display features and user interface functions as we discuss the trainers interaction with the displays.

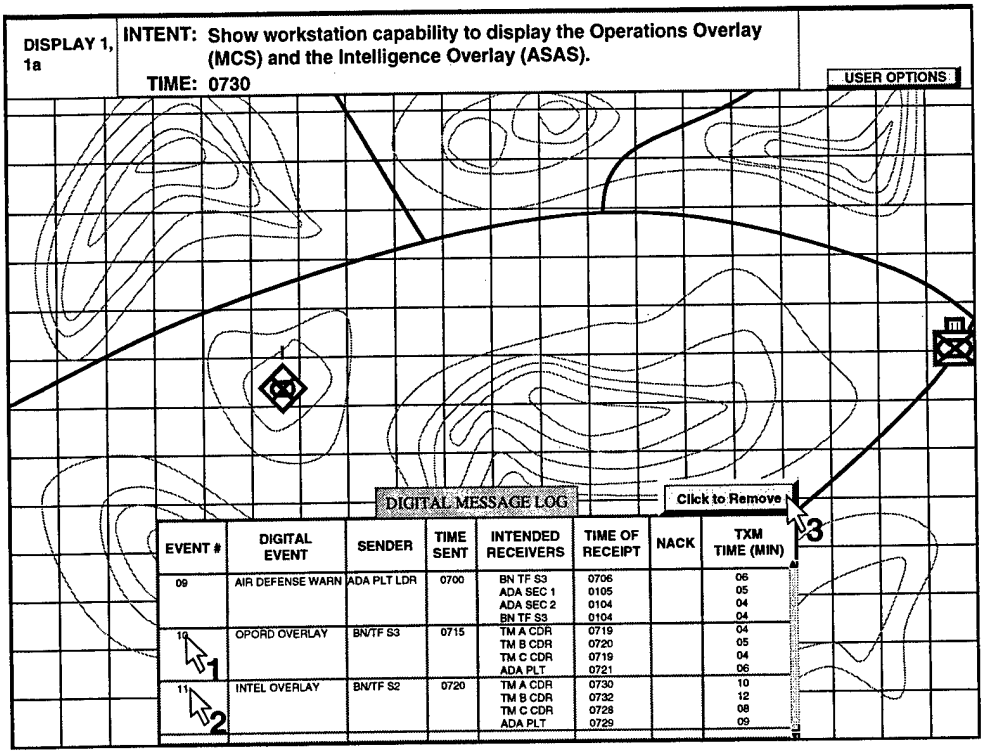
BOLD text- represents analyst selection of an item (mouse click)

Italics - represents analyst-entered data

"Quotes" - represents names of dialog boxes

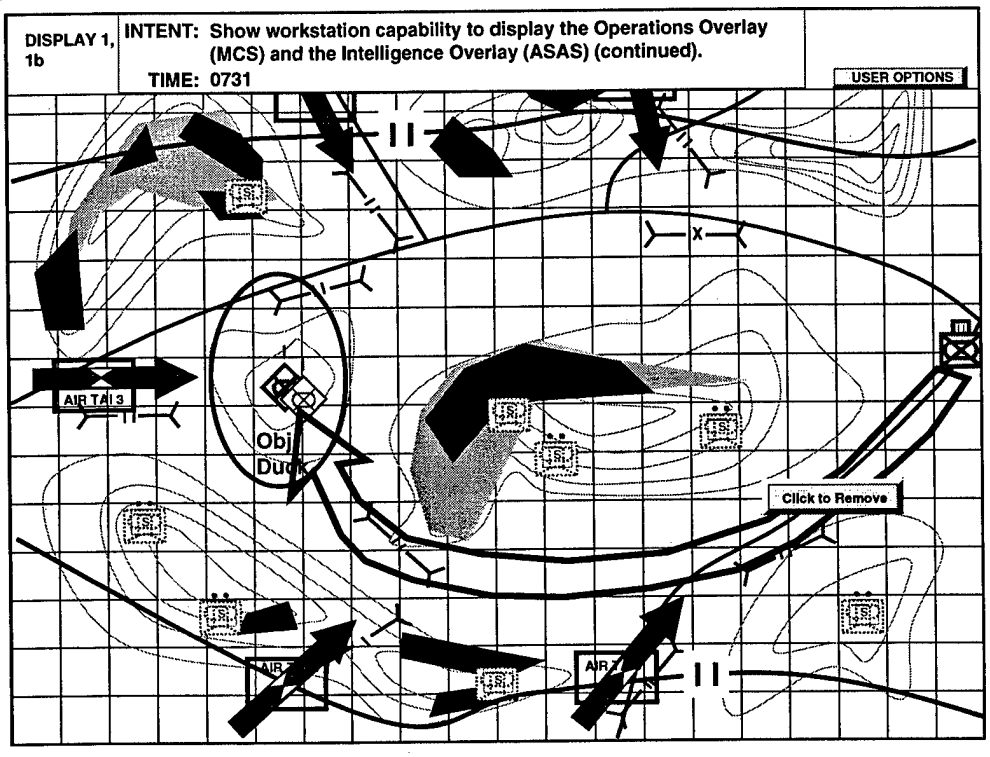
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show workstation capability to display the Operations Overlay (MCS) and the Intelligence Overlay (ASAS).								
SHTU/FBCB2 DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
NONE.	**DISPLAY 1 :** Ground truth of the Bn TF area of operation.		**X**		**DISPLAY 1a :** *Digital Message Log.* Shows each filtered message type and unit selected by user as it is transmitted and keeps a running log of the messages until the user changes the message filter selection. TRIGGER. When the system senses a filtered message, it enters the message information into the "Digital Message Log." **DISPLAY 1b :** *Message Content.* Provides user with display of the overlays. TRIGGER. User selects **EVENT #25** and **#26** to cause the overlays to appear.		**X**	



TAF ANALYST/WORKSTATION ACTIONS. The analyst notices the Operations Overlay and the Intelligence Overlay have been received so he decides to display them. He clicks on **EVENT #10** and **EVENT #11**, then removes the Digital Message Log by clicking **Click to Remove**.

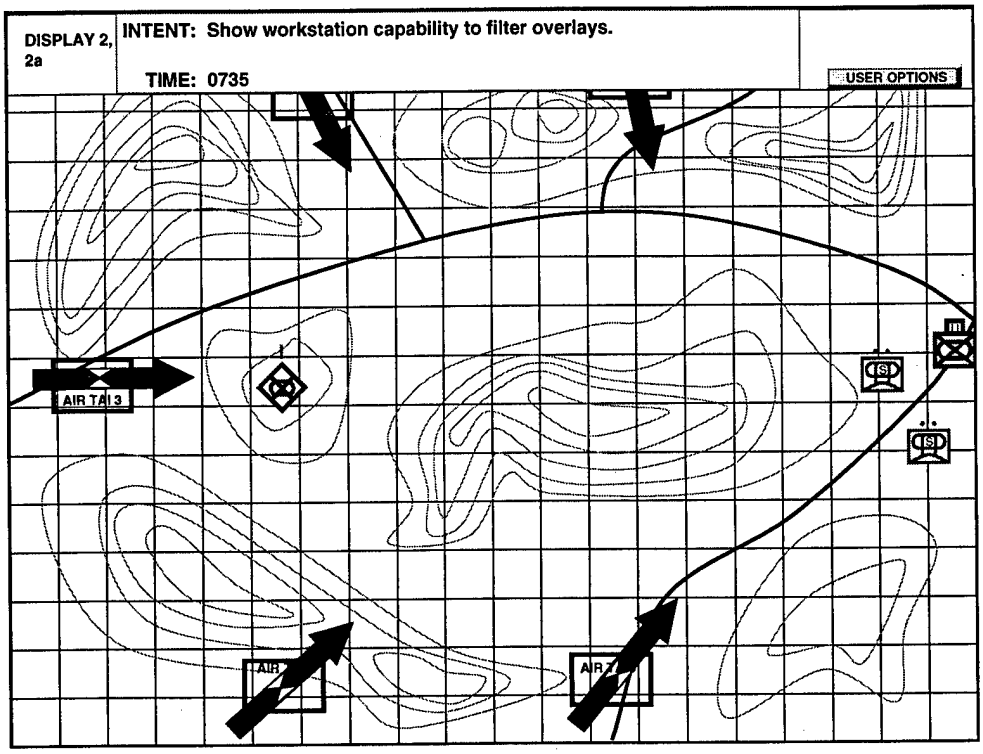
SCENARIO. The Bn TF is preparing to begin movement to the objective.



TAF ANALYST/WORKSTATION ACTIONS. The analyst notes where the air avenues of approach and air NAIs are located. He also notes the small discrepancy between the ground truth and perceived truth location of the OPFOR unit on the objective.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show workstation capability to filter overlays.								
SHTU/FBCB2 DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
NONE.	**DISPLAY 2 :** Ground truth of the Bn TF area of operation under selected graphics.		X		**DISPLAY 2a :** *Overlay.* Shows only the portion of the overlays the analyst wishes to view. TRIGGER. Analyst clicks on graphic and then uses the Delete key on the keyboard.		X	

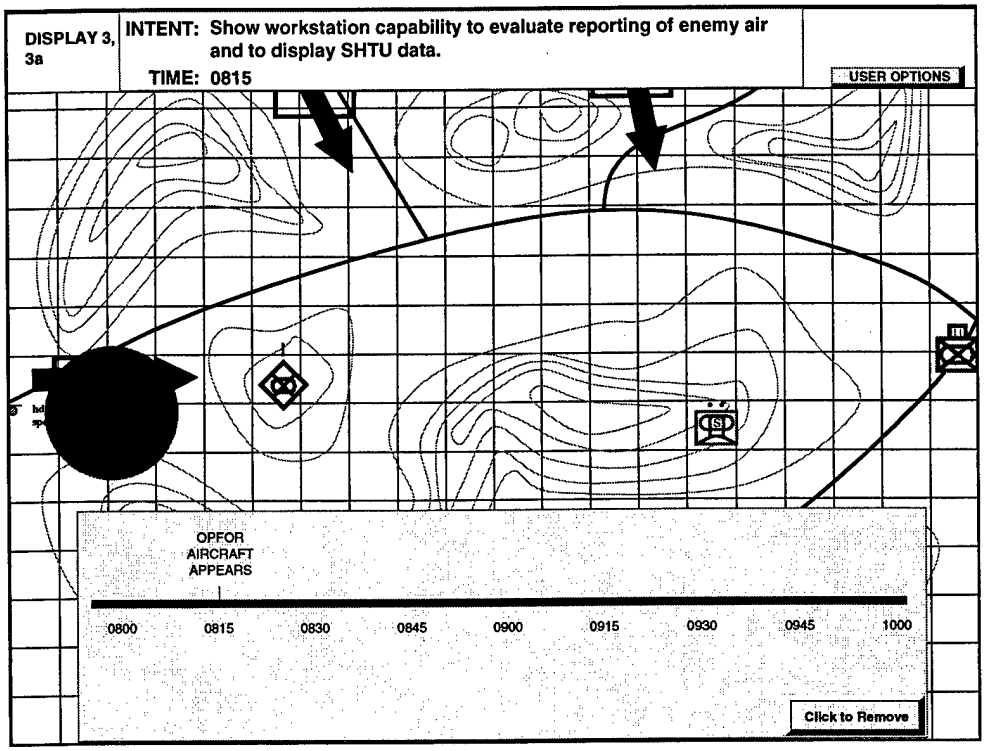


TAF ANALYST/WORKSTATION ACTIONS. The analyst removes the unwanted portions of the overlays by clicking on the graphic and pressing **Delete** on the keyboard. The analyst also breaks the ADA sections out of the Bn TF graphic and the system shows their respective locations.

SCENARIO. The Bn TF advanced units begin to deploy.

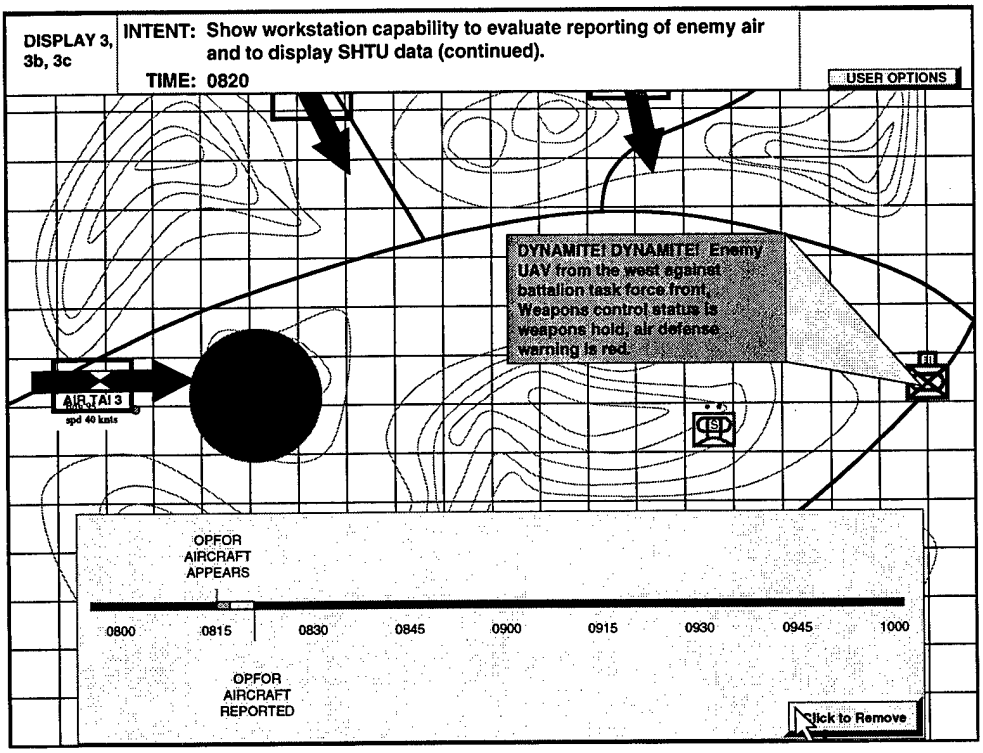
C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show workstation capability to evaluate reporting of enemy air and to display SHTU data.								
SHTU/FBCB2 DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
SHTU data. TRIGGER. User selects USER OPTIONS, AIR DEFENSE, SHTU from pull-down menus.	**DISPLAY 3 :** Ground truth of the Bn TF area of operation under selected graphics and SHTU display. System shows area where OPFOR UAV is looking.		X		**DISPLAY 3a :** *Automatic Timeline Entry.* Causes the system to make an entry on the timeline and the timeline displayed. TRIGGER. System senses new entry of OPFOR aircraft on the SHTU display. **DISPLAY 3b :** *Time-tag Voice Communications.* User has message selections available to time-tag. TRIGGER. User selects ADA Warning from "Time-Tag" selection box. **DISPLAY 3c :** *Evaluation of ADA Warning.* Shows if unit met ADA warning standard. TRIGGER. System compares the MTP standard with the standard achieved by the unit and displays the appropriate symbols on the timeline.		X	X



TAF ANALYST/WORKSTATION ACTIONS. The workstation senses the arrival of an enemy aircraft and automatically places the event on the timeline and labels it. The workstation also begins to count the time between when the aircraft is first displayed and when the Bn TF is notified of the presence of hostile aircraft in its area of operations.

SCENARIO. The Bn TF is beginning movement to the objective.



TAF ANALYST/WORKSTATION ACTIONS. The analyst receives the radio transmission of the air defense warning for the Bn TF and time-tags the event as an air defense warning. The workstation takes the time reported and uses a green line until the one minute time limit has passed, then the line becomes red striped. The line continues until the analyst time-tags the air defense warning. At that time, the line stops. The analyst selects this as an AAR aid.

DISCUSSION POINTS FOR AAR DISPLAY 3

WHAT HAPPENED: (Trainer Entry)

There were five minutes between the time the OPFOR UAV appeared on the SHTU and the time it was reported.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. Were the platoon SHTUs operational?

2. What caused the report to be delayed?

HOW TO IMPROVE: (System Entry)

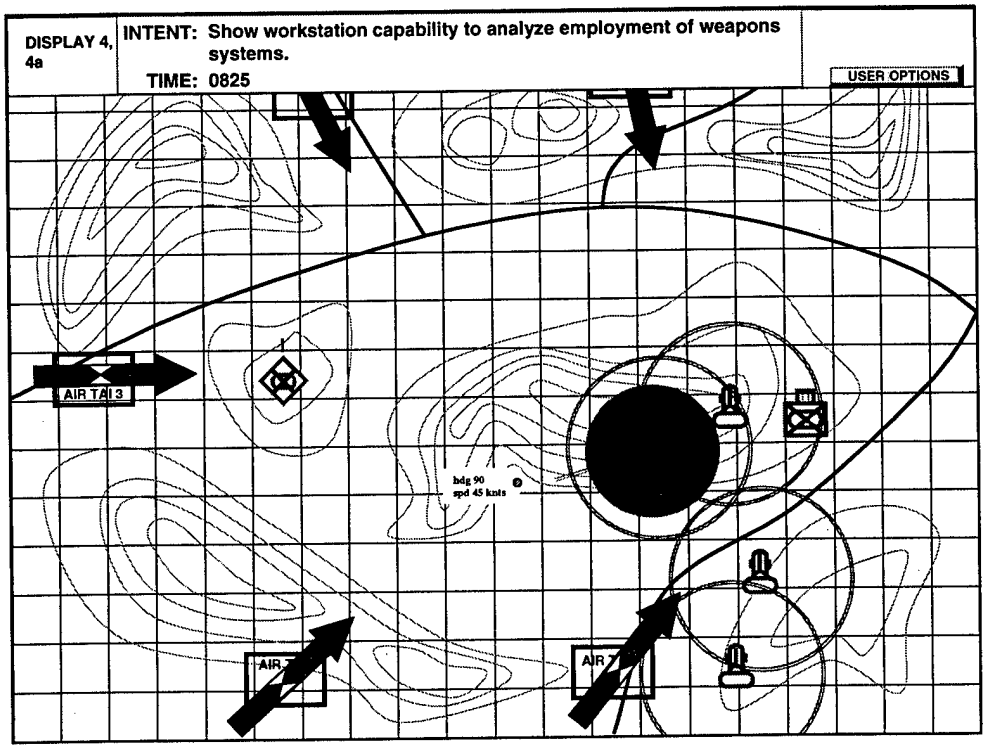
The Linebacker platoon leader should transmit a local air defense warning (LADW) message over both the maneuver force command net and the platoon net within one minute of enemy aircraft beginning engagement or observed entry into Bn TF sector. Dynamite is the LADW that alerts the maneuver force of an attack; the response, according to SOP should be immediate.

Reference: FM 44-43, FKSM 71-2-1 (EXFOR)-MTP

TAF ANALYST/WORKSTATION ACTIONS. When the system detects that the time for reporting enemy air activity in the Bn TF area of operation has been exceeded, it begins a search of its database to find "Facilitating Questions" and "How To Improve" statements, along with references pertaining to reporting enemy air activity in the Bn TF area of operation. The system places the information in the AAR bin until the Analyst has time to place his comments on the aid and modify it to reflect the situation.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show workstation capability to analyze employment of weapons systems.								
SHTU/FBCB2 DATA	**TAF WORKSTATION DISPLAY**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**	**TAF WORKSTATION SUPPORTING DISPLAYS**	**Near Real-Time/ Alert to User**	**Show on User Cmd**	**AAR**
SHTU data.	**DISPLAY 4 :** Ground truth of the Bn TF area of operation under selected graphics and SHTU display. System shows area where OPFOR UAV is looking.		X		**DISPLAY 4a :** *Weapons Fans.* Shows the range fans of selected weapons systems in selected units. TRIGGER. User selects USER OPTIONS, AIR DEFENSE, FANS, WEAPONS, 25MM, then selects ADA weapons platforms in the two ADA sections.		X	X



TAF ANALYST/WORKSTATION ACTIONS. The analyst has broken the ADA sections into individual Linebackers and the system now shows them in their respective positions. When initializing the workstation, the analyst enabled the workstation to

automatically show range fans for whatever weapons systems fire. He has enabled this feature for the air defense platoon only. He notices the UAV is out of 25mm HEI-T range and creates an AAR aid.

SCENARIO. The Bn TF is begins passive air defense measures. The Linebacker fires its 25mm HEI-T ammunition at the UAV and misses. The other Linebackers prepare to engage the UAV. The UAV detects the Linebacker that fired at it but does not sense any of the other elements of the Bn TF.

DISCUSSION POINTS FOR AAR DISPLAY 4

WHAT HAPPENED: (Trainer Entry)

Linebacker A23 fired at the OPFOR UAV with 25mm HEI-T ammunition while the UAV was out of 25mm HEI-T range.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. Why did you use the 25mm vice a Stinger at a longer range?

2. What prompted you to fire the 25mm at the range you did?

HOW TO IMPROVE: (System Entry)

Fire units must be positioned so they are capable of engaging enemy air platforms before they can release their ordnance on, or gain intelligence about, friendly forces. The following is a table depicting Linebacker weapons, ammunition, and effectiveness.

WPN/AMM	FIXED WING		HELICOPTER	UAV	RANGE*
	SLOW	FAST			
Coax MG	Yes	No	Yes	Yes***	900m
HEI-T**	Yes	Yes	Yes	Yes***	2,000m
APDS-T	Yes	Yes	Yes	Yes***	1,700m
Stinger	Yes	Yes	Yes	Yes	4,000m

* Max effective range for aerial

** Recommended as primary ammunition against aerial targets because of self-capability at 3,000m which reduces likelihood of

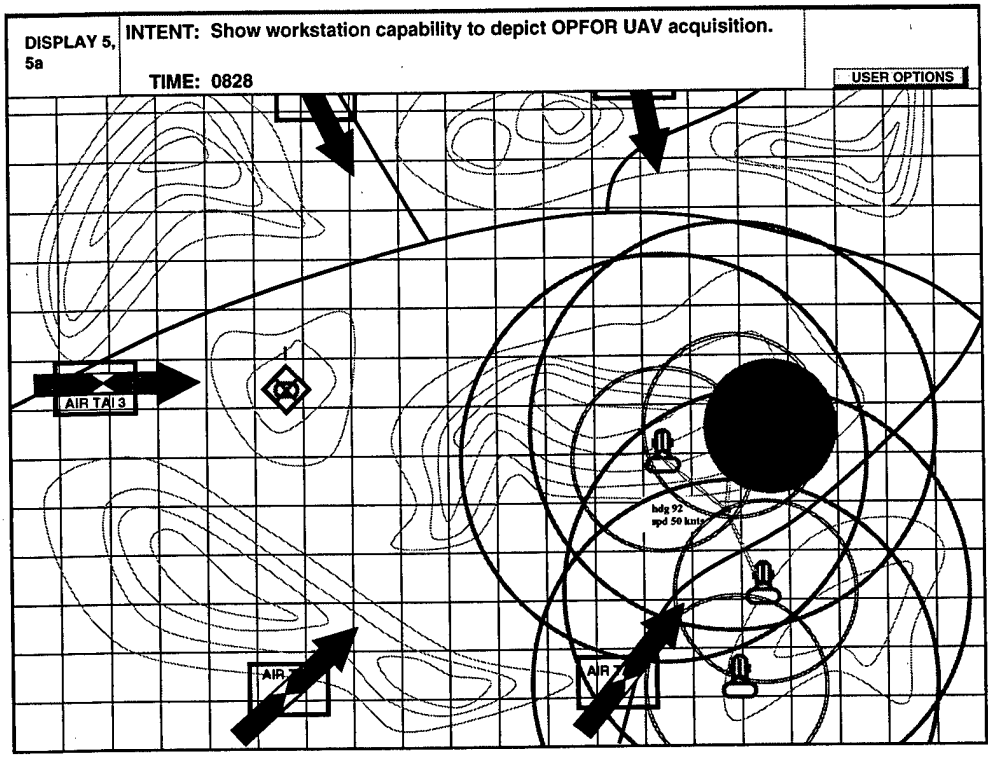
*** Probability of kill is minimal; volume of fire increases

Reference: FM 44-43

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show workstation capability to depict results of not killing the OPFOR UAV at the farthest range.

SHTU/FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
SHTU data.	**DISPLAY 5 :** Ground truth of the Bn TF area of operation under selected graphics and SHTU display. System shows area where OPFOR UAV is looking.		**X**	**X**	**DISPLAY 5a :** *Weapons Fans.* Shows the range fans of selected weapons systems in selected units. TRIGGER. User selects USER OPTIONS, AIR DEFENSE, FANS, WEAPONS, Stinger, then selects AD weapons platforms in the two ADA sections.		**X**	**X**



TAF ANALYST/WORKSTATION ACTIONS. The analyst notes the destruction of the UAV and the area it was sensing when it was shot down. He selects to have the Stinger fans appear to contrast the difference between when the UAV was destroyed and when it could have been engaged by a Stinger. The analyst selects this as an AAR aid.

SCENARIO. The Bn TF continues to employ passive air defense measures.

DISCUSSION POINTS FOR AAR DISPLAY 5

WHAT HAPPENED: (Trainer Entry)

The OPFOR UAV penetrated the Bn TF area of operation and sent images of the Bn TF back to OPFOR before being killed.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. Why was the UAV allowed to penetrate so far before being killed?

2. Why was the Bn TF not prepared for the UAV?

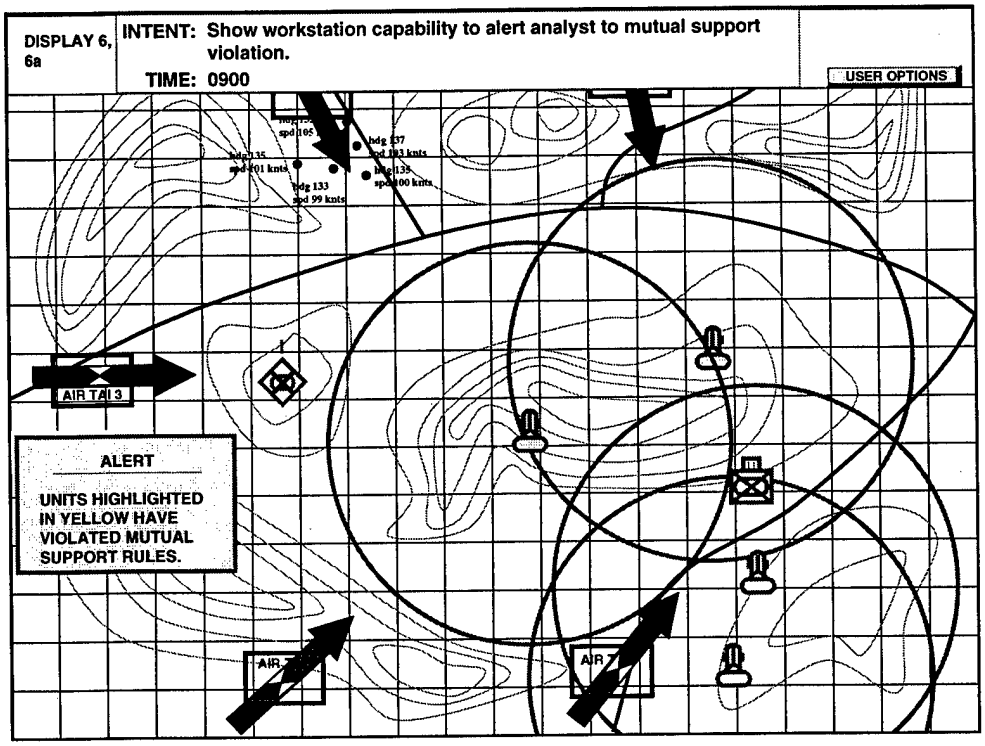
HOW TO IMPROVE: (System Entry)

Fire units must be positioned so they are capable of engaging enemy air platforms before they can release their ordnance on, or gain intelligence about, friendly forces. The following is a table depicting Linebacker weapons, ammunition, and effectiveness. With the mobility of the Linebacker, fire units should be located well forward and integrated into the supported task force scheme of maneuver. Depth is achieved by positioning fire units so threat air platforms encounter a continuous volume of fire as they approach the protected force or asset.

Reference: FM 44-43

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show workstation capability to alert analyst to mutual support violation.								
SHTU/FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
SHTU data.	**DISPLAY 6 :** Ground truth of the Bn TF area of operation under selected graphics and SHTU display.	X			**DISPLAY 6a :** *Alert.* Provides user an alert stating the unit has violated the mutual support guidelines. The systems highlights the offending units. TRIGGER. System checks the positioning of ADA vehicles within each section and alerts the user when they are farther than 2,000m apart.		X	X



TAF ANALYST/WORKSTATION ACTIONS. During initialization, the analyst selected for the workstation to detect when ADA Linebackers, within respective sections, were more than 2,000m apart and to alert him by showing an alert message and highlighting the offending Linebackers and automatically creating an AAR aid. The analyst notes the OPFOR helicopters on the workstation and turns off the 25mm range fans. When the workstation senses the violation, it displays the alert, highlights the offending Linebackers and creates the AAR aid.

SCENARIO. The ADO gives the air defense warning within the proper time limit. The Bn TF continues its movement toward the objective, but under overhead cover.

DISCUSSION POINTS FOR AAR DISPLAY 6

WHAT HAPPENED: (Trainer Entry)

The Linebackers of 1st Section were over 2,000m apart, violating the mutual support rule.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. Did you realize you were over 2,000m apart?

2. What was the tactical reason for violating the mutual support rule?

HOW TO IMPROVE: (System Entry)

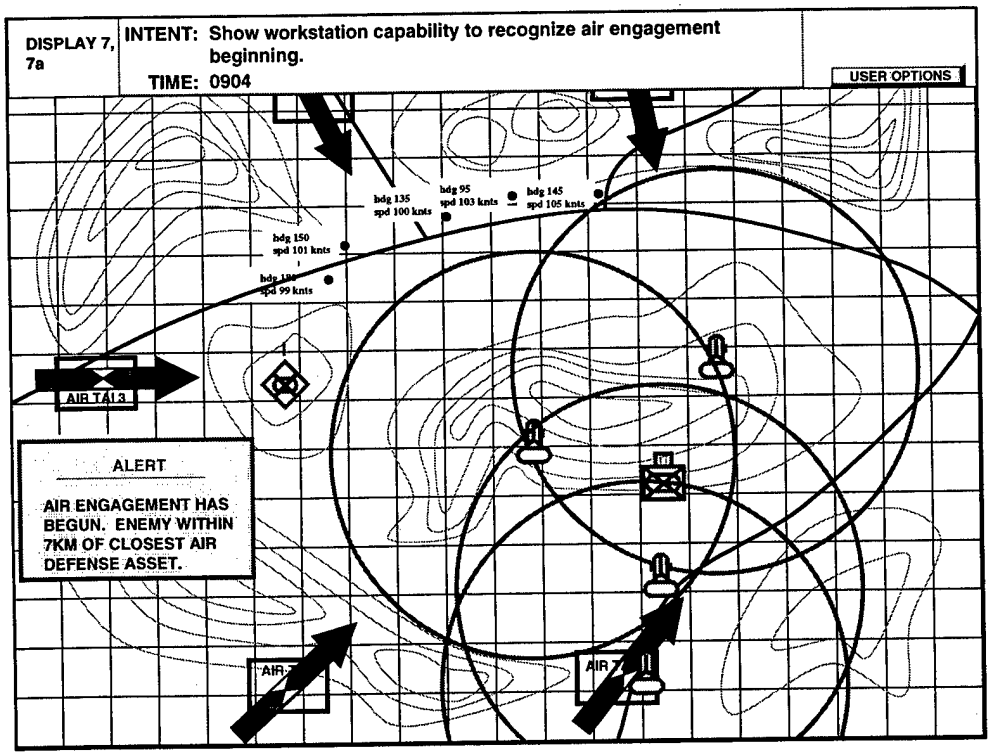
The planning range for mutual support for Stinger systems is approximately 2,000m. The planning range of overlapping fires for Stinger systems is approximately 4,000m.

Reference: FM 44-43

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show workstation capability to alert analyst to the beginning of an air engagement.

SHTU/FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
SHTU data.	**DISPLAY 7 :** Ground truth of the Bn TF area of operation under selected graphics and SHTU display.	X			**DISPLAY 7a :** *Alert.* Provides user an alert stating an air engagement has begun. TRIGGER. System senses one of the OPFOR aircraft has come within seven kilometers of the closest ADA weapons platform.	X		



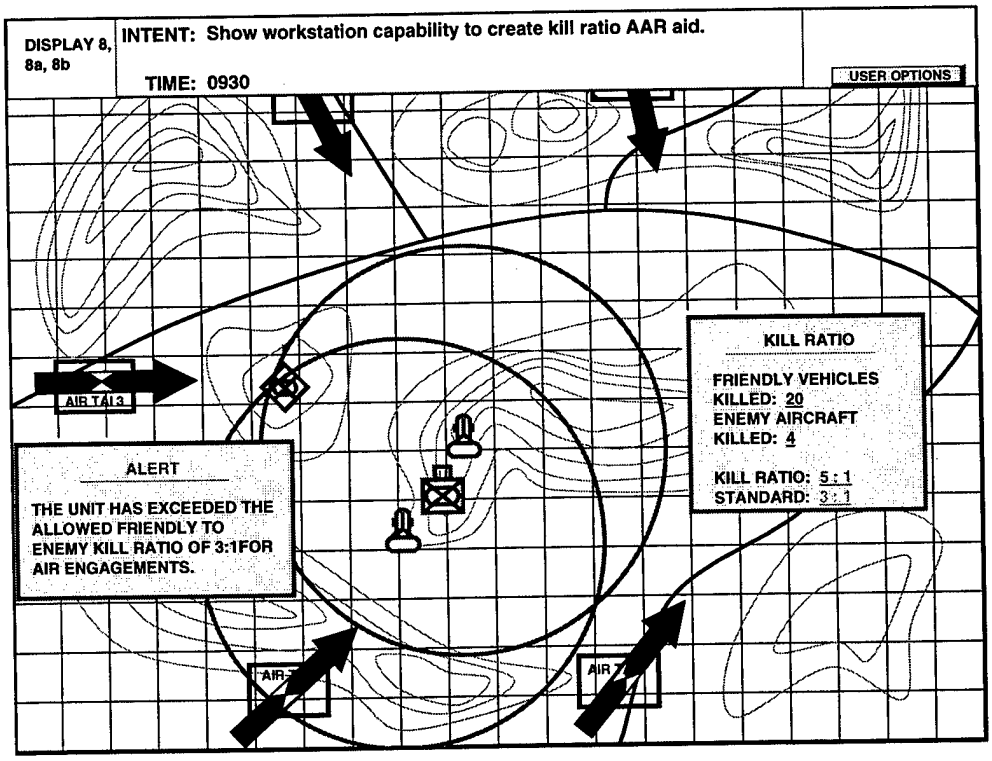
TAF ANALYST/WORKSTATION ACTIONS. During initialization, the analyst selected for the workstation to detect when OPFOR aircraft were within 7km of the closest air defense weapon system and to alert the analyst that an air engagement is beginning. The workstation begins to count any weapon systems that are killed and whether they are OPFOR or BLUFOR.

SCENARIO. The Bn TF prepares to take active air defense measures and continues its movement toward the objective. The southern ADA section is moving west to continue to provide protection to the Bn TF.

C4I PERFORMANCE ASSESSMENT MATRIX

INTENT: Show workstation capability to create kill ratio AAR aid.

SHTU/FBCB2 DATA	TAF WORKSTATION DISPLAY	Near Real-Time/ Alert to User	Show on User Cmd	AAR	TAF WORKSTATION SUPPORTING DISPLAYS	Near Real-Time/ Alert to User	Show on User Cmd	AAR
NONE.	**DISPLAY 8 :** Ground truth of the Bn TF area of operation.	X			**DISPLAY 8a :** *Alert.* Provides user an alert stating the unit has exceeded the friendly to enemy kill ratio for an air engagement. TRIGGER. System senses there are no more enemy aircraft on the SHTU and has counted the number of black-boxed vehicles between the time the air engagement began and the aircraft no longer appeared on the SHTU. **DISPLAY 8b :** *Kill Ratio.* Shows the friendly to enemy kill ratio for a set amount of time. TRIGGER. When the system senses the air engagement is complete, it automatically generates a kill ratio display.		X	X



The analyst wants to check to see if the task force stayed within the 3:1 kill ratio stated in the MTP. The system checks the black boxes on the vehicles and counts them. It finds the kill ratio was 4.5:1. The analyst creates an AAR aid.

TAF ANALYST/WORKSTATION ACTIONS. Once there are no longer aircraft appearing on the workstation, it inventories the number of OPFOR and BLUFOR vehicles killed since the air engagement began. Since the kill ratio was exceeded, the workstation displays an alert, then the results of the kill ratio calculations and creates an AAR aid.

SCENARIO. The Bn TF prepares to assault the objective.

DISCUSSION POINTS FOR AAR DISPLAY 8

WHAT HAPPENED: (Trainer Entry)

The Bn TF violated the 3:1 BLUFOR to OPFOR kill ratio for air engagements.

FACILITATING QUESTIONS (WHY IT HAPPENED): (System Entry)

1. What defensive measures did the Bn TF take?

2. Did everyone in the Bn TF know there was an air attack in progress?

HOW TO IMPROVE: (System Entry)

When the platoon observes high-performance aircraft, helicopters, or unmanned aerial vehicles (UAV) that could influence its mission, it initially takes passive air defense measures unless the situation requires immediate active measures. In a passive air defense, the platoon takes actions (such as dispersing or stopping) to avoid detection altogether and/or to minimize the aircraft's target acquisition capability. The platoon also prepares for active air defense measures. (NOTE: When the platoon is operating as part of a company team or troop, tank crews must be familiar with required actions in the company-level battle drill.)

Passive air defense includes all measures used to prevent attack by threat aerial platforms except engagement by fire. If the situation allows: 1) units should travel by covered and concealed routes when moving, 2) turn vehicles 90 degrees from the direction of attack and seek cover and concealment, 3) wipe out track marks after moving into position, 4) occupy positions which offer natural cover and concealment when stopped, 5) dig in and camouflage dismounted positions, 6) Disperse vehicles as much as possible, 7) cover windshields, headlights, and canopies of vehicles to retard glare, making detection difficult, 8) Require air guards on each vehicle and at each position and rotate them, 9) Establish an air attack warning system, 10) include in the SOP the passive air defense measures tailored to the unit.

Reference: FM 17-15, FM 44-43

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